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by *WILLIAM H. AXELSON, electrical contractor*

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Volume 35 **Number 8**

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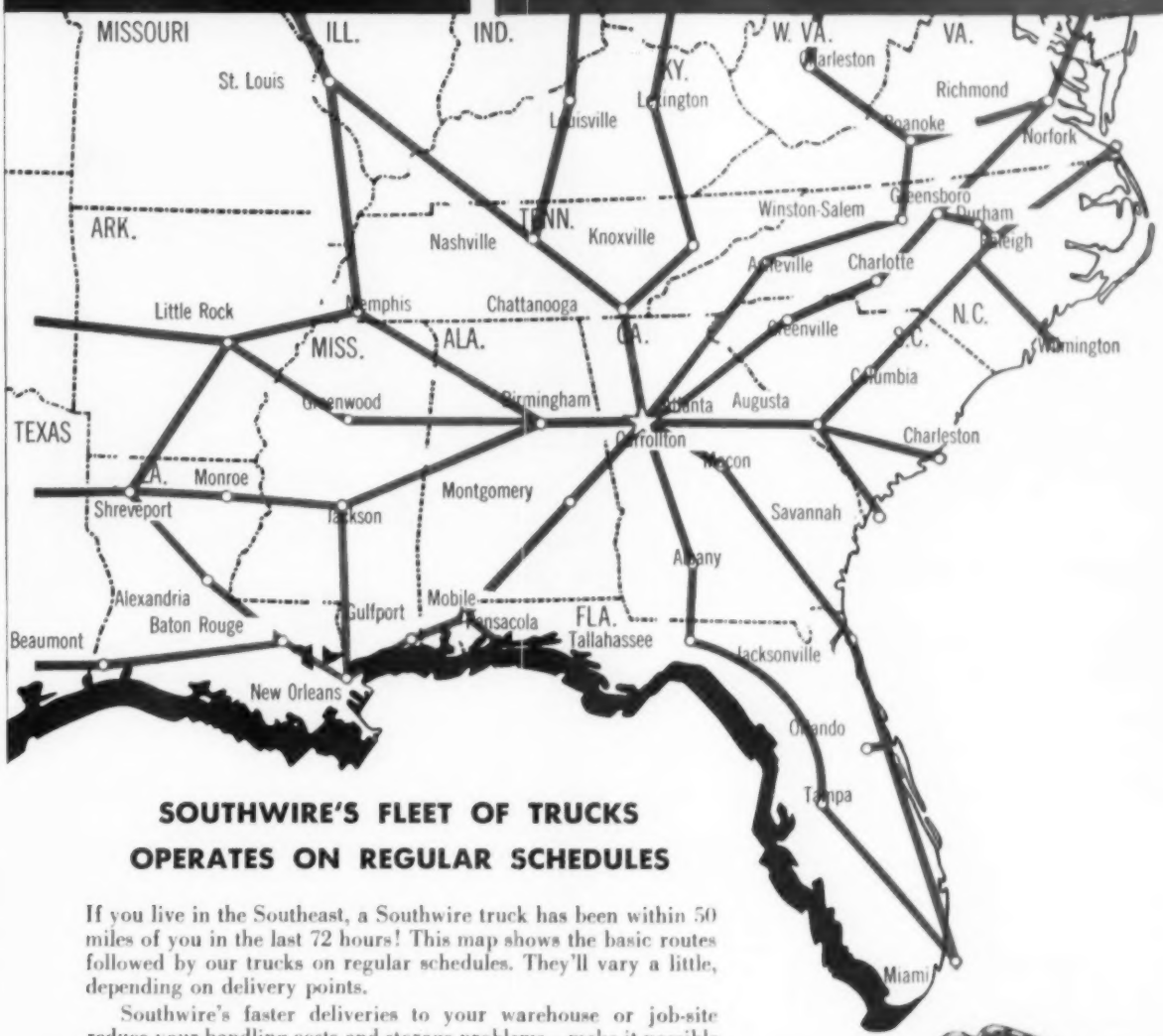

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SERVING THE 18 SOUTHERN AND SOUTHWESTERN STATES

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ANNUAL ELECTRICAL SPACE HEATING ISSUE

The entire electrical industry has become aware of the business potential of electrical space heating. The increase in air conditioning loads in the last two or three years has given the utility companies a real interest in electric heating as a means of smoothing out the annual load curve.

Electrical wholesalers, too, have recognized the profit possibilities of electrical heating, and 75 per cent of the Southern wholesalers are handling some type of electrical heating equipment.

But only a relatively small number of contractors are selling electrical heat aggressively, yet the contractors stand to benefit most from this development. By establishing themselves from the start as the proper channel through which electrical heating equipment should be purchased, they will prevent the loss of this business to others such as the warm air heating and ventilating trade.

This issue has been designed especially to help the contractor obtain a broad general view of the equipment available, how it is used, and how best to promote its use.

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Economic comment

by J. Whitney Bunting, Ph.D.

◆ IN PRACTICALLY all phases of the economic picture the economy of the South continued to spiral upward directing this area to continued first place among national regions. Continued strength has been found in the construction industry, for several years now the bulwark of economic good times. Both new residential and business construction have continued their advance, and, although slightly below the average for the nation as a whole, they have indicated a continued willingness on the part of industry and business to put their roots down in the South.

The bulk of this improvement can be found in the South Atlantic States, where new construction amounted to over a billion and a quarter dollars during the first three months of the current year. All other states in the southern region produced construction figures of a similar amount for the same period. However, since the latter figure must be divided among ten states as compared with only six for the South Atlantic region, the great predominance of construction effort for the southern region appears centered in the southeast.

Retail buying strong

Also remarkable in the same analysis is the retail sales volume for the first quarter of 1955. Here the South as a whole equalled the national average advance over the preceding year's first quarter. Since many have questioned the probable continuation of heavy consumer spending, the fact that latest figures show real strength in retail buying should bring cheer to those with pessimistic thoughts. In fact if retail volume continues to expand both nationally and regionally as it has, then 1955 will go down in records as a truly brilliant economic year.

Several times in past columns it has been repeated that the strength of economic advance must lie largely in the hands of consumers and their willingness to buy goods at today's increasing prices. True inflation has managed to be slow but steady to date. Yet there may, and probably will, come a time when increased consumer resistance is felt in opposition to the high cost of many products and services.

This is only a natural result when one is forced to choose among a variety of expensive items or the possibility of saving money for future purchases of the same products after inflation has perhaps passed. This comment naturally brings a reflection on today's labor relations pattern.

Labor bargaining, 1955

The picture in this area is now quite clear. It has taken several large negotiators to set the stage, but the pattern is now inescapable. Labor leadership, seeing an era of good times stretching on into the future, desires now a guaranteed annual wage for their memberships and a definite pattern of fringe benefits making most employees in reality a permanent charge upon the business corporation.

Good times and the free flow of moneys made this appear to be a good time to pressure for these advantages, and it was. Ford, General Motors, U. S. Steel, and other companies have refused to risk interrupted production and sales in order to argue or combat labor leadership. Thus the worker finds himself, temporarily at least, in one of the best economic positions of his entire unionized history. But this cannot be (and should not be) the whole story.

One must realize, in this nation today, that labor has tried to gain for itself many of the advantages once considered to be the area of management. Industry, particularly since the close of World War II, has not only given in but in several instances has preceded general labor demands with programs of its own for workers. Such conditions are frequent in periods of good times when profits are plentiful and competition for buyers approval is strong.

Resistance to high prices

However, again a word of caution. In spite of profits and high wages the shadow of consumer resistance to high prices is always in the picture. The economic gains of the steel workers were only accomplished at the cost of a general steel price increase of $7.50 per ton. The average consumer may reflect that he does not buy a ton of steel and so may not be affected adversely. Yet there are very few products today that can be made without some relation to steel; it may be a basic part of a product's construction; or it may be needed for buildings and machines that are necessary to the manufacture of the commodity.

In many ways, the price of steel enters into the price of the goods that the American consumer needs. So it is mere wishful thinking if one believes that the steel advance will have no bearing upon the pocketbooks of Americans.

The moral of the story is that for every labor wage advance, sooner or later there will be an effect upon the ability of the consumers to buy. In good times, this moral seems to lack strength and purpose, and it is often flagrantly disregarded by both labor and management. This is, however, an extremely shortsighted policy and can only lead to reconsideration and revision later when economic pressures turn down as in recession or depression eras.

Many advances in business controls have been made, but one should not assume that labor and management can go to extremes in negotiations and not have "to pay the piper" later on.

Dr. Bunting is a well-known southern economist and educator.

No modern building would be complete, even with its "curtain walls" of glass or aluminum spandrels, without an integrated lighting environment. With this premise in mind, Sunbeam Lighting Co. offers a new series of architecturally designed luminous cells. These are surface-type units (#6600 series) with a very shallow appearance and engineered to produce high levels of low brightness lighting. For maximum interior design and illumination potential over six types of modern diffusing mediums are available. Translucent white, "drop" Plexiglas panels and miniature-celled plastic louvers are particularly attractive for contemporary plans. For detailed information on these Sunbeam Visionaires and our surface-type 2 by 4-foot and 4-foot square "large area" cells please write for bulletin #A17.

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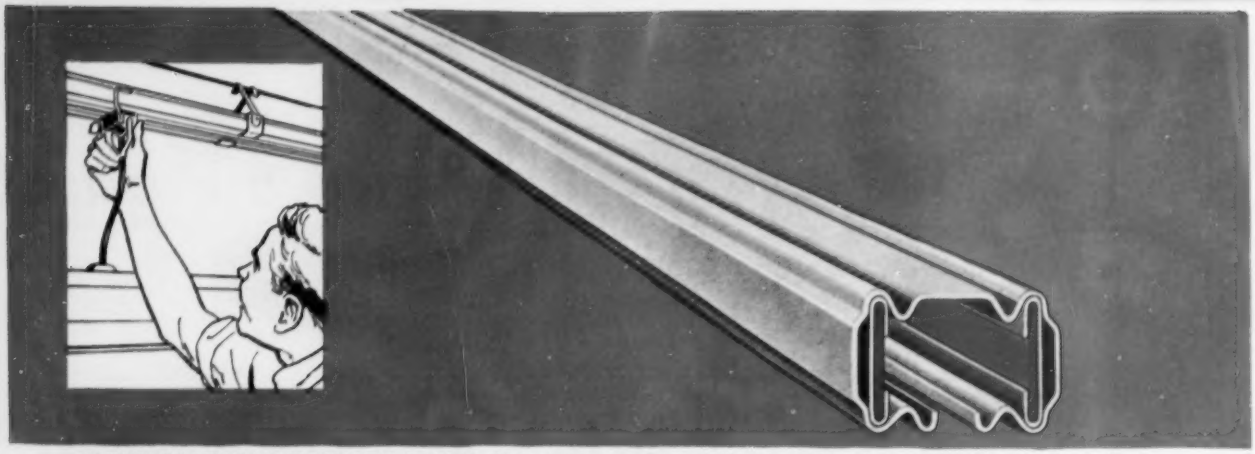

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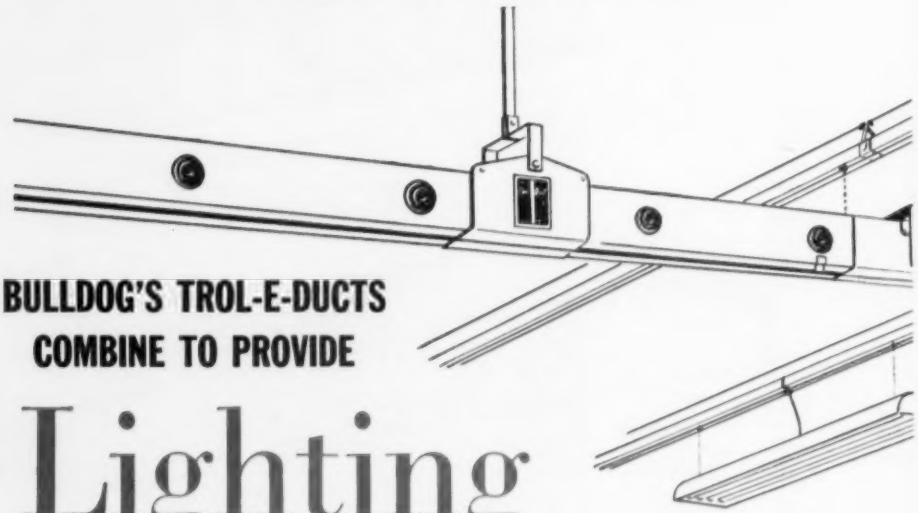

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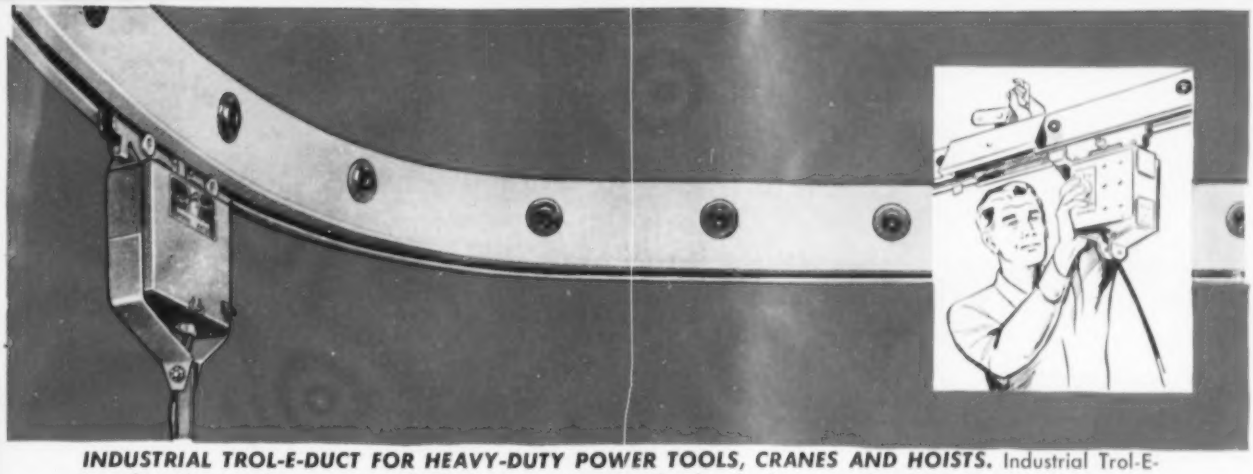

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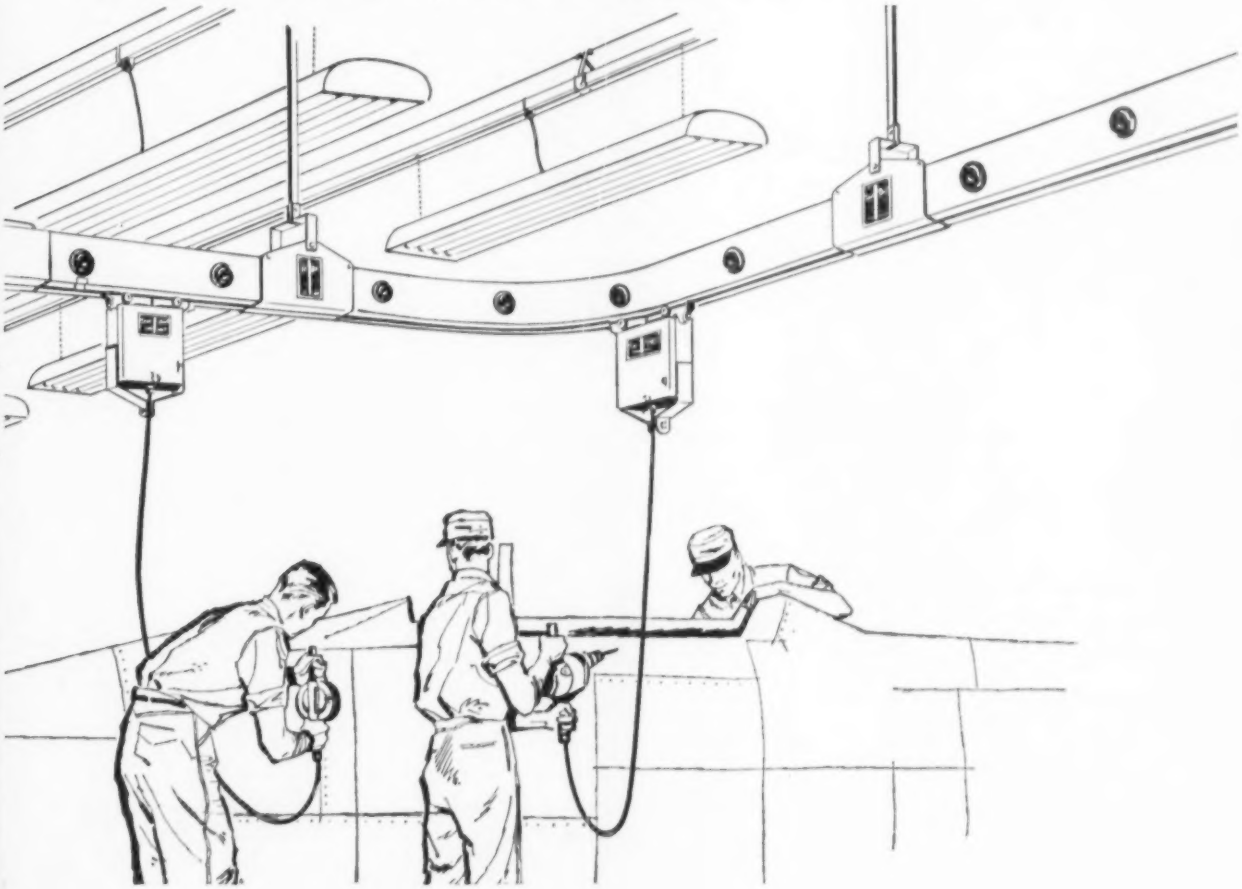

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Available Free to Readers of Electrical South upon Request

1048—Plug-In Strip

An illustrated catalog showing the complete "Plug-in" Strip line has recently been published by National Electric Products Corp., Pittsburgh, Pa. This eight-page illustrated brochure pictures the three and six foot standard lengths of the multi-outlet branch circuit assembly.

1058—Conductor Fittings

A handy, pocket-size catalog of their complete line of conductor fittings is available from Penn-Union Eletcric Corp., Erie, Pa. The 80-page catalog is thoroughly indexed and also has handy locator tabs for extra speed in use. Specifications and illustrations of each item are included.

1076—Modular Lighting

A 20-page booklet containing interesting and useful information about the "modular system" of lighting can be obtained by writing to the Mitchell Manufacturing Co., 2525 Clybourn Ave., Chicago 14, Ill.

1082—Lighting Equipment

Preprints of the F. W. Wakefield Brass Co.'s eight-page section on lighting which will appear in the 1954 Sweet's Catalog are available on request to Wakefield, Vermilion, Ohio. Included are descriptions of 11 major types of lighting equipment.

1086—Cable Connectors

Tomic Sales and Engineering Co., 4864 Woodward Ave., Detroit 1, Mich., now have available catalog sheets containing data on the complete line of their connectors, couplings, and cable connectors.

1088—Fittings and Fixtures

A 32-page illustrated catalog covering Killark fittings and fixtures is offered by Killark Electric Mfg. Co., Vandeventer and Easton Aves., St. Louis 13, Mo.

1090—Midget-Size Busduct

Complete information on Power Plugin, the new, midget-size busduct, is found in bulletin No. 720, available from Frank Adam Electric Co., 3650 Windsor Pl., St. Louis 13, Mo.

1092—Electrical Boxes

Steel City Electric Co., 1207 Columbus Ave., Pittsburgh 12, Pa., offers a catalog of their complete line.

1130—Conduit Fittings

The latest completely illustrative catalog on their diversified line of conduit fittings is announced by the Atlantic Conduit Fittings Co., 589 Atlantic Ave., Boston 10, Mass.

1136—Space Heating Guide

Cavalier Corp., Chattanooga 2, Tenn., has prepared a Guide for Calculations of Electric Space Heating. It is based on study of several thousand installations of electric heat and is a handy reference for calculating electric heating requirements and estimating operating costs. The booklet contains discussion, charts, and floor plan examples.

1150—Fluorescent Fixtures

Colorful, 20-page catalog. Front cover shows interesting illustration of "Light through the Ages." Catalog gives complete specifications and pictures of entire Naturlite line manufactured by Light & Power Utilities Corp., 1035 Firestone Blvd., Memphis, Tenn.

1156—Industrial Lighting

The new Abolite Catalog and Handbook contains a complete descriptive story of all commercial, industrial floodlighting equipment manufactured by Jones Metal Products, Inc., West Lafayette, Ohio.

1166—Electrical Fittings

A 40-page illustrated catalog and price list on the Gedney line. Shown and listed are conduit, threaded entrance, SEC, EMT and ground fittings, and box connectors for both armored and non-metallic cable. Copies are available from Gedney Electric Co., RKO Bldg., Radio City, New York 20, N. Y.

1178—Remote-Control Wiring

Bulletin 16-200 is a 36-page manual describing layout and installation of remote-control wiring, and is available from General Electric Co., Construction Materials Dept., Bridgeport 2, Conn. Advantages and explanation of the system are followed by illustrated installation procedure.

1184—Approved RHW Wire

Bulletin No. 1018 describing first Underwriters' Approved Type RHW Wire, developed to meet the new National Electrical Code standards, is available from Simplex Wire and Cable Co., 79 Sidney St., Cambridge 39, Mass.

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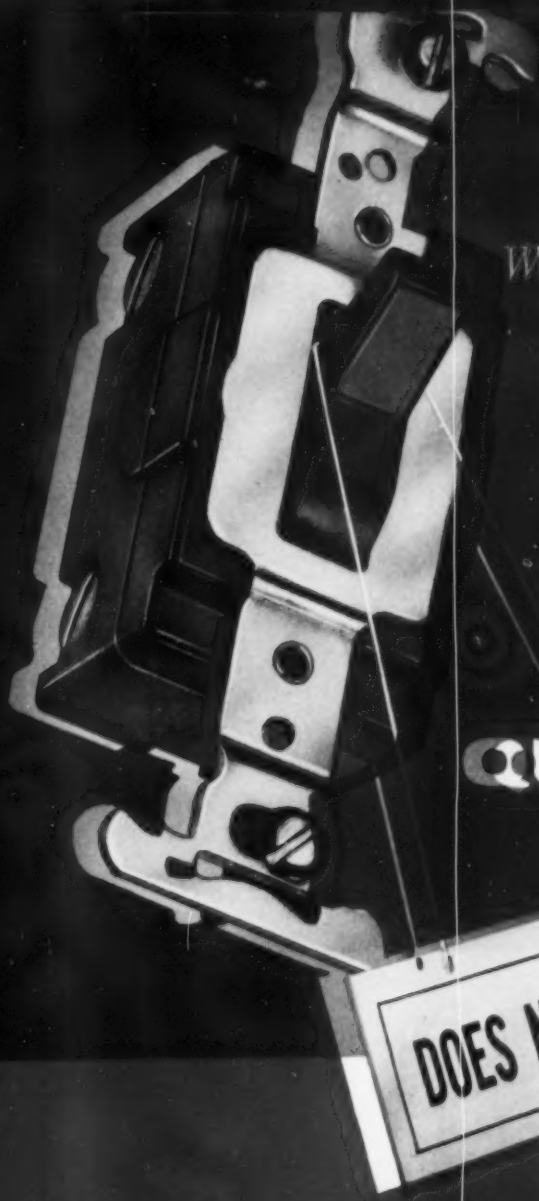

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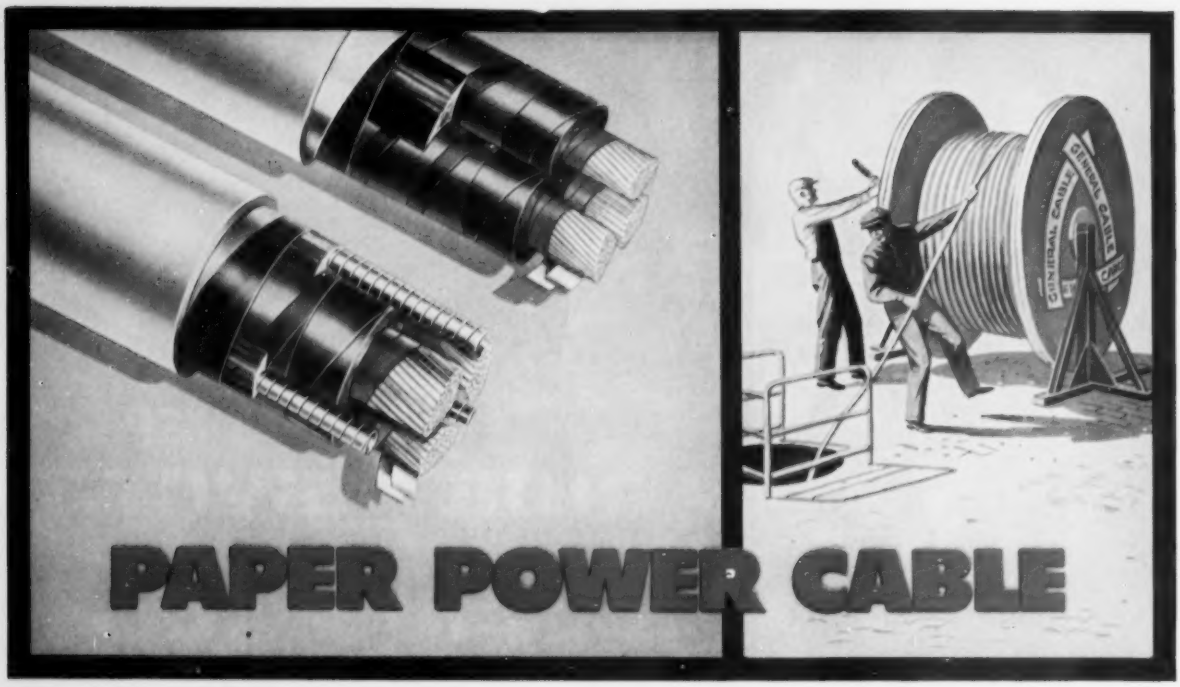

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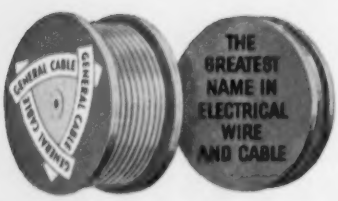

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FOR NEW HOMES AND OLD. Easily installed. No need to tear into walls. Two lengths fill every need—with 32" and 48" sections you can make any multiple of 16 inches.

ADDS PRESENT AND FUTURE VALUE. Homes heated with Cavalier Baseboard are worth more today and tomorrow. Discriminating buyers recognize its value—a big assist in meeting selective buying. *The finest heat you can have* will last a lifetime. No moving parts—requires no care, no maintenance.

INDIVIDUAL ROOM CONTROL. Thermostat in each room maintains the desired temperature . . . *automatically*. Here is "zone" control at its best. You choose the heat you want *by rooms*, not by sections of the home. For example, have it mild in bedrooms, warmer for grandmother's or baby's room. Warmth is supplied quickly and evenly.

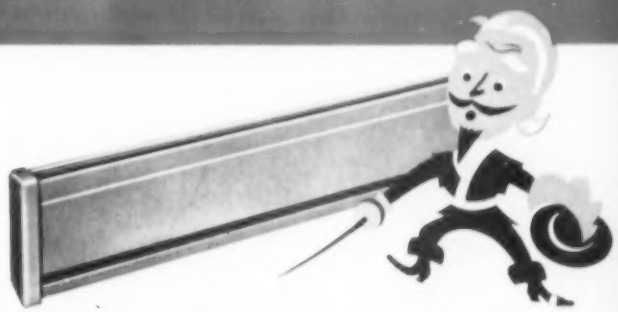
NEWEST DESIGN FEATURES OFFERED ONLY BY CAVALIER. Exclusive zig-zag baffles give air maximum travel over and around heating element. 100% efficient. Unique aluminized front baffle reflects heat away from front maintaining a cool exterior surface.

BLENDS BEAUTIFULLY WITH MODERN INTERIORS. Paint Cavalier Baseboard to match the trim in each room. Blends so perfectly it appears to be the usual baseboard trim found in homes.

MADE AND GUARANTEED BY CAVALIER—a respected name for 90 years. Cavalier automatic electric heaters are part of a family of nationally known products that have brought year-after-year customer satisfaction.

PROFITABLE FOR YOU. Cavalier helps you sell through national and cooperative local advertising. Increase your profits by promoting electric heat business. You sell more materials while selling your services. With Cavalier, your business-like markup is protected—Cavalier heaters are sold only through electrical contractors.

Phone your distributor or write Electric Heating Division, CAVALIER CORPORATION, Chattanooga 2, Tennessee



TRUE *BALANCED* HEAT

Cavalier Automatic Electric Baseboard Heat puts the heat where it is needed most—between the household and the cold outside. Gentle radiant heat with draftless circulation gives *balanced warmth, wall-to-wall comfort at all levels*. Individual automatic room control maintains desired temperature accurately.

HOW CAVALIER BASEBOARD WORKS

Cool air enters baseboard at floor level. Inside heater, the air is channeled over and around the heating element by Cavalier's exclusive zig-zag baffle. The warmed air rises and comes out from top. A "secondary" air current flows from the top of rear air passage. This extra flow picks up heat that otherwise would be lost into the wall and brings it out into the room where it is needed most. Gentle radiant rays do the rest in the simplest, most effective heating system ever devised.

WITH CAVALIER'S COMPLETE LINE OF NATIONALLY ADVERTISED AUTOMATIC ELECTRIC HEATERS AND ITS AGGRESSIVE COOPERATIVE AD-PLAN, YOU CAN

Be there first with the best

Send for catalog and price list.

1186—Electric Heating File

This file offered by Electromode Corp., 45 Crouch St., Rochester 3, N. Y., is made up to suit individual requests for information on Electromode Heaters for domestic, industrial or farm use; or to contain material on the complete Electromode line if desired.

1190—Electrical Fittings

Blackhawk Industries, Dubuque, Iowa, offer a new two-color bulletin describing and illustrating B-I Electrical Fittings and Fixtures. Included are conduit and cable fittings, conduit and cable straps, staples, box supports, sill plates, locknuts and bushings, wire holders and yard lights.

1192—Wire Pulling Lubricant

Illustrated six-page folder showing the advantages of an improved Y-Er Eas wire pulling lubricant is available from Electro Compound Co., 3812 150th St., Cleveland 11, Ohio.

1200—Fluorescent Fixtures

Complete information on commercial fluorescent and incandescent lighting of all types, for offices, schools, libraries, etc., and all industrial locations available from Benjamin Electric Manufacturing Co., Leader Div., Northwest Highway, Des Plaines, Ill.

1202—Code Explanation

Bulletin 2660 contains up-to-date information (following 1953 Code revision) on why equipment for hazardous locations is designed and built as it is, and is available from Crouse-Hinds Co., Wolf & 7th, No., Syracuse 1, N. Y.

1204—Conduit Fittings

Illustrated Catalog available upon request to Electrical Fittings Corp., Woodside, N. Y., or their nearest warehouse in your locality contains complete information on the company's electrical conduit fittings, conduit nipples, couplings, and elbows.

1214—General Catalog

General catalog of Royal Electric Co., Inc., Pawtucket, R. I., covering flexible service and lamp cords, cord sets, extensions, trouble lights, wiring devices and decorative Christmas lighting is available to wholesalers. Dealer catalogs may be secured from Royal distributors.

1218—Carbon Products

A 28-page catalog on Motor and Generator Brushes and carbon products telling how to order brushes, grade recommendations, characteristics and description of brush grades is available from the Helwig Co., 2536 North 30th St., Milwaukee, Wis.

1220—Stadium Lighting

The Pyle-National Co., 1334 N. Kostner Ave., Chicago, Ill., announces the availability of a new eight-page bulletin, No. 605, on stadium lighting, describing in detail floodlighting of a typical outdoor athletic arena stressing the importance of using fully enclosed floodlights.

1224—Electrical Equipment

The Wadsworth Electric Mfg. Co., Inc., Covington, Ky., has issued a new catalog Con 15-0 and Bulletin W. C. B. 53-1, containing data on their lines of Safety Switches, Service Equipment, Distribution Panels and "E-Z-RED" Circuit Breakers.

1228—Time Controls

A revised and enlarged edition of the booklet "How Time Controls Save Work, Time and Money on the Farm" has been announced by the Paragon Electric Co., Two Rivers, Wis. The revised edition includes new time control applications devoted to showing farmers how to earn more money by actually doing less work.

1230—Hot Line Repairs

Twenty time-saving techniques for making hot line repairs and replacements are detailed in a new 72-page, spiral-bound, pocket-size book for on-the-job use. Included are useful charts giving the characteristics of all bare conductors. Copies are available from James R. Kearney Corp., Dept. HF, 4236 Clayton Ave., St. Louis 10, Mo.

1236—Lighting Fixtures

Novelty Lighting Corp., 2481 East 22nd St., Cleveland 15, Ohio, is now offering two new catalogs of their church and other lighting fixtures line. Catalog No. 62 illustrates lighting for interiors and exteriors of churches of any denomination. Catalog No. 63 and Folder No. 183 describe exterior bronze lanterns for public buildings and residential use, and the complete line of Novelty recessed fixtures and directional exits signs for church, school, commercial and residential use. All three publications are available upon request.

1238—Selecting Fuses

A 12-page descriptive handbook "Fuseology" tells how to get safest, most dependable, trouble-free electrical protection from fuses. Contains useful information on selecting right size and type of fuses — how to stop needless blows — avoiding poor contact and other troubles. Issued by Bussmann Mfg. Co., University at Jefferson, St. Louis 7, Mo.

1240—Catalog of Fixtures

Catalog No. 9 of Prescolite Manufacturing Corp., 2229 Fourth St., Berkeley 10, Calif., available upon request, contains attractively drawn illustrations of fixtures and scale drawings of their dimensions, as well as descriptive information and suggested applications for each fixture in the Prescolite line. List prices of the fixtures in Catalog No. 9 is inserted as a separate sheet with each of the booklets.

1242—Distinctive Lighting Fixtures for the Home

Jay Lighting Manufacturing Company, Inc., 25 Quincy Street, Brooklyn 38, New York has available upon request a new six-page illustrated supplement featuring their fixtures for the home.

1244—New Electrical Fittings Catalog

Concise 36-page catalog illustrates and describes a complete line of electrical fittings, cable racks and wiring specialties. The catalog contains many detail drawings, clear-cut photographic illustrations of mast fittings, cable connectors, straps, hangers and ground clamps in a wide variety of types and sizes. For your free copy, write The M. & W. Electric Mfg. Co., East Palestine, Ohio.

1248—Conductor Armor

A new catalog of Superformed Armor Rods, Lineguards, Patch Rods, and Tap Armor describing various uses and applications of these products on overhead conductors is offered by The Fanner Manufacturing Company, Brookside Park, Cleveland 9, Ohio.

1250—Electrical Enclosures

Catalog No. 5354 currently being offered to the trade by B & C Metal Stamping Co., 590 Means St., N. W., Atlanta, Ga., is a well-organized, 66-page manual giving complete descriptive information, prices, and specifications on all items in the B & C line of electrical enclosures. Copies are available free of charge to electrical contractors.

1254—Construction Anchors

"Anchoring for Power and Communication Lines," a completely illustrated manual on improving line construction with better anchoring, has been published by the Advertising Dept., the A. B. Chance Co., Centralia, Mo. The 25-page booklet shows how to install the right anchor at the right place in the right way.

1256—Engineered Lighting Data

Available from The Perfeclite Company, 1457 East 40th Street, Cleveland, Ohio, is their No. 54 catalog — 85 pages of engineered lighting data. Also available is their 12-page, 4-color Exit data folder No. Ex-55-A; and a 4-page data folder No. 54-B on three-ring plastic concentric ring units.

1252—Conduit Data

Latest edition of their Conduit Data Booklet is now available from Pittsburgh Standard Conduit Co., 61 Bridge St., Pittsburgh 23, Pa. The booklet contains Code and Federal specifications, tables of electrical symbols, UL specifications, and several other tables of specific information about various types of conduit and components. The booklet is illustrated and contains a listing of Pittsburgh Standard agents in principal cities.

"Easy Does It"

THE PHRASE COINED BY THE TRADE TO DESCRIBE . . .

TOMIC

Tap-Ons

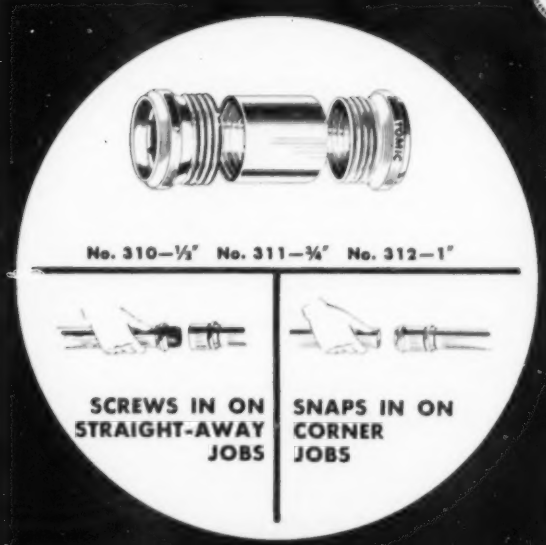
FOR EMT

Pat. No. 2458276

Tap-On | THINWALL CONNECTORS

EASIEST OF ALL TO INSTALL!

- Pre-flexed stainless steel lock washer.
- Slips on tube with little effort.
- Makes safe, permanent vibration-proof 6-point ground around entire tube.
- OK in concrete slabs — perfect for cramped or corner locations.
- Does the job better, easier.



Tap-On | THINWALL COUPLINGS

UNMATCHED FOR VERSATILITY

- With Tap-Ons you can go from heavy pipe to Thinwall without special fittings.
- With Tap-Ons you can go from Thinwall to Greenfield or ANY type cable.
- With Tap-Ons, all connections screw together. Will never shake loose.
- With Tap-Ons, you can snap tubing into couplings in corners or close quarters.

Manufacturers of "Today's Finest Fittings"

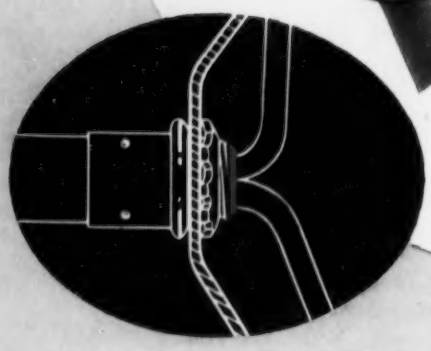
TOMIC SALES & ENGINEERING CO.

20,000 SHERWOOD AVE. • DETROIT 34, MICH.

Red Throat

B-M 21B, THE NEW INSULATED THROAT INDENTER CONNECTOR FOR E.M.T.

Four Ways Finer



1. Protruding rounded red plastic lip of bushing prevents cutting of insulation—eliminates shorts.
2. Full thread screws into all conduit fittings. Lip of RED THROAT bushing protects thread from damage.
3. Deep dished eight pronged lock nut is easier to drive on—screws flush to shoulder and digs into metal of box for vibration proof positive ground.
4. Permanent locked-in bushing insures smooth burr-free raceway for easy fishing. No extra work and costs no more.

Briegel, the Original Indenter Fittings are neater in appearance, easier and faster to use. Installation is simple and less expensive. Two quick squeezes sets them forever. Try B-M Indenter Fittings and get more profits from each job!

ALL BRIEGEL FITTINGS ARE U. L. APPROVED AS CONCRETE-TIGHT

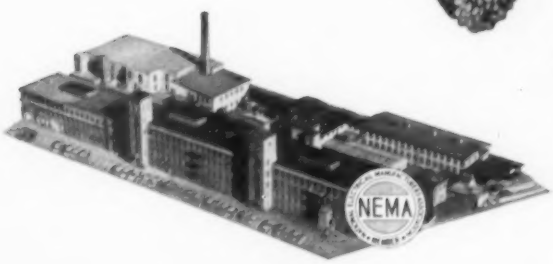
Order from Your Wholesaler!

All B-M Indenter Fittings are U.L. Approved as concrete-tight and for general use (File Card E10863). Also comply With Federal Specifications W-F-406.

BRIEGEL METHOD TOOL CO.
GALVA • ILLINOIS

Warehouse Stocks in Principal Cities for Immediate Delivery!

When the going's roughest specify the toughest*



Carol®

Subsidiary of Penn-Texas Corporation

CAROL CABLE COMPANY

Division of the Crescent Company, Inc., Pawtucket, R. I.

Serving Industry for more than 30 years

*FOR COMPLETE INFORMATION, WRITE DEPT. ES.

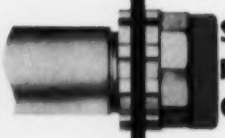
insulined

THE NEW CONCEPT IN FITTINGS THAT REDUCES WIRE PULLING EFFORT UP TO 50%

Insulating Bushing

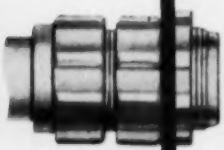
Insulated Metallic Bushing*

Insulated Chase Nipple



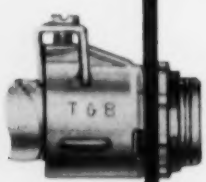
STANDARD RIGID CONDUIT

Insulated EMT Connector



ELECTRICAL METALLIC TUBING

Insulated Tite-Bite Connector — straight



FLEXIBLE CONDUIT OR ARMORED CABLE

Insulated Tite-Bite Connector — 90°

*available soon

Look for the bright blue "insulined"!

ANOTHER NEW T&B ENGINEERED EXCLUSIVE —
The First Line of Self-Insulated Raceway Fittings! Just look at the many benefits you get with these new "insulined" fittings.

They are the *EASIEST* to Install

Factory-assembled, the Insuliner is a permanent part of the fitting — it can never come loose or pull out. The slippery insulined throat cuts pulling effort by as much as 50%.

They make the *SAFEST* Installation

Because of the nationwide accent on safety, the trend is toward insulated fittings in all locations. Insulated bushings are standard fittings today. Extremely tough they are unaffected by common acids, solvents, moisture or fumes.

They make the *MOST ECONOMICAL* Installation

A one-piece fitting makes installation fast and easy for maximum on-the-job savings. There is no need to add a separate insulating bushing.

They give the Installation a *QUALITY LOOK*

Strong, longer bodies and heavy lock nuts . . . 100% visibility . . . accurate threading . . . all of the features you've come to expect in a T&B engineered fitting.

Write for free samples and technical data or contact your nearby T&B Distributor.

LOOK FOR THIS SIGN —

All T&B insuline fittings bear Underwriters Laboratories Approval

IT'S THE MARK OF AN AUTHORIZED T&B DISTRIBUTOR

The complete line of T & B fittings for conductors and raceways is sold only by recognized electrical wholesalers. It's our way of assuring you the service and savings of a friendly local source. Call him for all your electrical needs. T58

THE THOMAS & BETTS CO.
INCORPORATED
72 Butler Street • Elizabeth 1, New Jersey
Thomas & Betts Ltd., Montreal, P.Q., Canada
MANUFACTURERS OF QUALITY ELECTRICAL FITTINGS SINCE 1898

Accidents reduced...costs cut...with HAPCO Aluminum Standards

When Hapco Standards are installed, there's real reason for civic pride. Not only do they last longer, they look better longer because their silver gray surface is resistant to virtually all atmospheric conditions. Furthermore they require no maintenance so that the investment in Hapco Aluminum Standards guarantees minimum overall lighting cost. For proof that "Aluminum costs less," write the Hapco Engineering Department.

What's more, their high visibility helps reduce accidents.

Hapco Aluminum Poles are sturdy enough for the heaviest duty, yet they maintain harmonious beauty with their surroundings. All Hapco Standards are Venetian column type, acclaimed by architects for eye appeal and strength. For street lighting, for traffic control lighting, for area flood lighting, these Hapco Aluminum Alloy Standards allow you the widest possible choice in fine lighting equipment.

Be sure to call your Hubbard representative for assistance in specifying lighting standards, traffic signal pedestals, flood lighting standards, and related equipment. You can order Hapco products through more than 200 leading electrical distributors throughout the United States.

FREE HAPCO Catalog

If you'd like more details on design features and specifications of the complete Hapco line, write for this new free catalog. It contains valuable information to help you plan the most efficient, most beautiful highway and street lighting, as well as any other outdoor lighting requirement. (Hubbard Aluminum Products Company, 6301 Butler Street, Pittsburgh 1, Pa.)

HUBBARD ALUMINUM PRODUCTS COMPANY

Division of Hubbard & Company
Pittsburgh 1, Pa.

Portable power for contractors

Shop built mobile lighting and welding plant has proved its versatility on many jobs and has more than paid for itself

by Baron Creager

◆ A MOBILE, COMBINATION lighting and welding plant, shop-built at a cost of $1,500, has paid for itself at least three times during two years of service for the L. G. White Electric Co., in Dallas, Texas, according to Mr. White.

L. G. White, left, and L. T. Vaux, general superintendent, conceived the idea of a mobile plant and together supervised its construction.

Home of L. G. White Electric Co. Lease of adjoining tenant has been cancelled and company will soon occupy entire building it owns, expanding into space not shown at left.

L. T. Vaux, general superintendent for the company, estimates the portable plant has traveled 3,000 miles and has been used on at least 40 different construction jobs in the two years.

The plant has hardly been idle a day during this service, is used on Sundays to provide temporary power and lights, enables crews to proceed with their work during rare power failures or circumstances which require cutting off power and is indispensible in a job involving an unwired building.

Excellent time saver

An inestimable amount of time has been saved by making power available at out-of-the-way spots.

"If we need a hole through a masonry wall, for example," Mr. White suggested, "we simply come up with our portable power, use an electric hammer and knock out our hole. In an hour at the most we are through with our job whereas, the same job used to tie us up for a day.

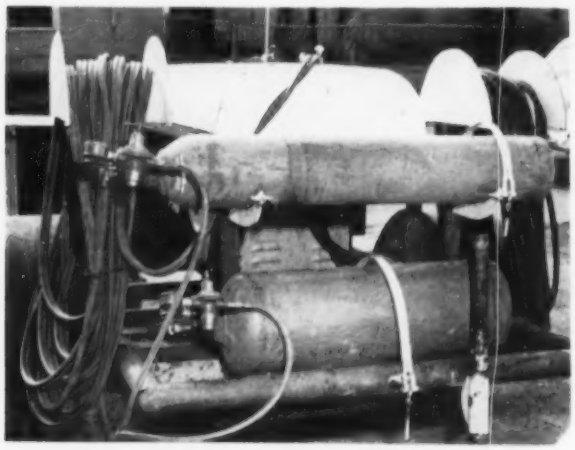
"This power plant is highly valuable in underground work, too. We just finished a job in Shreveport, La., that was largely underground distribution and our mobile power plant was a key factor there."

In the course of many jobs the L. G. White Electric Co. found an acute need for such portable power and, since it could not be purchased commercially, Mr. White and his force decided to create what was needed.

Gasoline for power

Central feature is, of course, the welding and lighting plant—a 200-ampere welding machine in con-

Side view of the mobile light, power and welding plant showing the tool chest on the front. Cradles on the sides contain cable and hose. In the rear is a 200-ampere welding machine and gasoline motor.



Steel straps hold tanks of fuel in place. Hose and cable are carried in tool chest on road. Sliding leg at right mounts foot on bottom and steadies trailer when in use on the job.

With the third wheel in contact as shown, two men can move the loaded trailer on level ground. This is especially helpful on the job where construction work would make moving impractical.

junction with a 5-kw generator powered by a gasoline engine. This plant is centrally mounted on a frame, four feet by 10 feet.

Outside frame members are 2-inch pipe, mortise-welded at the joints, and cross members are two-inch angle iron and pipe. At the front is a sheet steel tool chest with hinged lid, 5 by 2½ by 2 feet. The chest is used for storing electric hammers and drills, torches, hose, cable and other equipment while the "rig" is on the road. When stationary on the job, cradles on the sides contain cable and hose.

From rear to the coupling in front, the trailer is 15 feet overall and weighs approximately 1,200 pounds loaded, but will safely follow the pilot truck, generally a pick-up, at legal road speeds.

In addition to tools and special equipment, the load includes 400 feet of jointed cable, so that it can be used in different lengths as needed, and 210 feet of hose, 105 feet each for cutting and welding.

(*Continued on page* 62)

How to advertise electrical heat

by William G. Raoul*

◆ MARK TWAIN was once asked whether finding a spider in his newspaper was good luck. He replied: "Finding a spider in your paper is neither good luck or bad. The spider was merely looking over the paper to see which merchant was NOT advertising so that he could go to the store, spin his web across the door and lead a life of undisturbed peace afterward."

Whenever I get into an argument with electrical contractors over advertising (which is pretty often), I find the first problem is to agree on what advertising really is. We all advertise more than we realize. I like to think of advertising as the whole broad field of telling your customers about your products and services. Looked at in this way it is easy to see that we all have to advertise in one way or another; the only argument is over *how* to advertise.

Personal interviews tops

Without any question, the most effective advertising you can do is your own interviews with customers. You can tell them more, and you can be convincing. You can answer questions and resolve doubts. You can close the sale. Whether you call it advertising or just plain selling (there's no difference in my mind) this kind of contact with prospects and customers is the backbone of any business.

This is particularly true in the field of electric space heating, and those contractors who do the best job with electric heat invariably spend a great deal of time in personal selling. Electric heat is new to most people. They know its marvelous cleanliness and convenience, and they are usually convinced it costs too much. They don't realize how many hidden savings are there to offset the cost of energy. This part of the story has to be told in some detail by a man who knows.

The electrical contractor is better qualified than anybody else to advise people on all phases of electric heat. He is the man who will put the job, and he ought to get the sale as well as the wiring. He does it by what I call *personal advertising*, which costs him nothing in money, but a great deal in time, which is money after all.

The one limitation of personal advertising is cost. It is far more expensive than we realize. You can only talk to so many people a day, and you have to run a business as well. You can't turn all the details of your business and your selling over to somebody else. It has to remain in your hands.

If you want to get a better idea of the cost of personal selling, compare the prices of articles sold on a house-to-house basis with the same articles when sold over the counter. It's a hard comparison to make, because the house-to-house seller has to depend on blind items. His price has to be about *twice* what it would be in a store (with a good deal of variation of course, depending on product) so that he goes to great lengths to get specialty items that are hard to compare. But it is amazing what he can sell. High price is no obstacle to the good salesman who gets into the home. A tremendous volume of business is done in this way.

Because of the high cost of personal selling, and the limited number of people available to do it, other forms of advertising come into the picture, as a means of reaching more people at lower cost. Right here is where the arguments begin. How much money should be spent on advertising? What is the best kind of advertising, and above all, how can you tell whether it is doing you any good? These are hard questions, with no simple answers, yet I believe there are some guiding principles which we can observe to make our advertising more economical and more effective.

The first thing to remember is that a heating system, electric or any other, is a long term purchase. Very few people are in the market at any one time. The people whom you can sell are either planning a new house or figuring on improving the one they have. This latter group—the conversion market for electric heat—is very important. At the best, however, the number of people you can sell is small in relation to the total public. Therefore a big effort in advertising will be wasted.

Successful advertising

Successful contractors tell us constantly that you should use small space frequently repeated. There is such a thing as too much advertising for your own good. Suppose you ran a big series of newspaper ads and pulled more inquiries than you could properly follow up with personal selling—you would be wasting money and probably losing good will too.

My company has this same problem with national advertising. We use magazine advertising, not only for electric heat but also for our lines of bedroom furniture and cedar chests, which we have been manufacturing in one form or another for ninety years. Each ad we run draws many hundreds of inquiries and we go to considerable pains to answer each person who writes us, and to refer the potential customer to one of our dealers.

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*Mr. Raoul is vice-president of the Cavalier Corporation, of Chattanooga, Tenn.

Sometimes we have a problem in making the dealer realize the importance of any inquiry—but this is getting aside from the main question; the important thing to remember is that your advertising will require more work on your part. Be ready for it.

The best plan is to start with a small outlay—small newspaper ads, radio spots, and perhaps direct mail. The next point is *continuity*. Plan to advertise steadily on whatever basis you have chosen for at least two months. At the end of that time will it be possible to tell how much good the advertising has done? No, it won't. But if you can trace any definite results at all—sales you *know* came from your advertising, you may be sure that the program is working.

In many cases you won't have this much to go on; there will be not a single sale definitely credited to your advertising. Even so, you might make a grave mistake by knocking off at this point. The only conclusion that seems to be always true with advertising is what Mark Twain's spider found out years ago—the firm that advertises steadily and intelligently seems to get ahead of the one that does not. You have to keep at it for a long time, which is all the more reason to keep your advertising modest in scale.

Promoting electric heat

What kinds of advertising, or media, are most successful with electric heat? Again there is no one answer, but I would say that radio spots are generally the most satisfactory, followed by small newspaper ads. After all, you aren't going to *close* any sales with this kind of campaign; the best you can hope for is to bring more prospects within reach of your personal selling. Radio spots can be wonderful reminders. Television? Be careful. Every town is a different situation, and you could waste a lot of money. I don't think television is in the picture for electric heat advertising by the average contractor.

Direct mail advertising is the most interesting medium of all, and without a doubt the most misused. Every day a large part of a ton of paper crosses my desk, and I don't doubt the same thing happens to you. Most of it is direct mail advertising of one form or another, but unfortunately I don't buy the things that are advertised. They got my name on their list years ago, and there it has stayed, costing the advertiser money and producing no sales whatsoever.

The same thing will happen to anyone who goes into direct mail advertising without a foolproof plan for making up and *maintaining* his mailing list. The weeding out of names is even more important than the adding on. Yet with all its problems, direct mail sent to the *right persons* can be the finest advertising possible. When you have a carefully made up list you are shooting at sales with a high powered rifle instead of a

(*Continued on page* 64)

An employee of Thurman-Logan Electrical Supply Co., of Chattanooga, Tenn., shows what additional electrical supplies and equipment are needed when electrical space heating is included in the contract to wire an average five-room house. Because the contractor's travel, supervision, and general overhead costs are increased by little, if any, this extra business shows a considerably better net profit.

The Parkway Motel, near Dothan, Ala., has installed approximately 70 ceiling type radiant glass heating panels in its guest rooms and offices. These ceiling units are particularly advantageous for motels since no wall space is required—important since more and more motels are furnishing rooms with two double beds.

Motel market for electrical heating

by Kiliaen V. R. Townsend*

◆ A GROWING NUMBER of experienced motel operators now recognize that electric heating is most acceptable from their own standpoint and certainly from that of their guests.

Together with a room air conditioner, electric heat with a thermostat in each room has introduced a flexibility and convenience undreamed of until recent years.

The only other method that is now given serious consideration is the central system which can both heat and cool since air conditioning has become a definite requirement in the last year or so, particularly in the Southern states. Because of widely publicized fatalities in connection with individual gas heaters, most tourists do not like such units which were so widely used until recently, for they refuse to believe that the improved, vented models are relatively safe.

Individual needs

Therefore, the electrical contractor is in reality competing only with the central air or water system. He can show the new motel builder that installation of electric heating, along with individual room air conditioners, is more practical, less expensive to install and, most important, more acceptable to the overnight guest.

The electrical contractor not only renders his motel customer a real service, but he has also probably tripled his own billing on the particular job. And it must be remembered that the motel owner is not being asked to spend more money; instead, he is being urged to direct a greater percentage of his total costs into electrical equipment and, incidentally, to spend less money.

What, then, are the arguments for going "all electric"? Such a step may seem utterly impractical to the uninformed, who still think of electric heating as practical only for bathrooms!

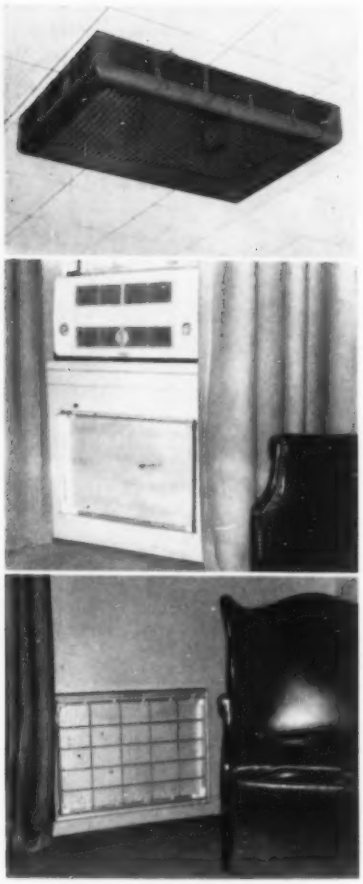
So that the prospect will at least consider the suggestion, he should be informed at the outset that there are several thousand motels already heated completely with electric heat, ranging from Montreal, Canada, to Florida, and from New York to California. Of more interest to those below the Mason-Dixon line, there are actually over four thousand motel rooms in Alabama, Georgia, Mississippi, South Carolina and West Florida heated with electric glass panels alone, which, of course, is just one type of electric heating and does not take into consideration the numerous courts using other forms of electric heating.

Cost per night

A number of these electrically heated motels were installed as long as seven years ago, such as the Stiles Motel, in Statesboro, Ga., served by the Georgia Power Company. Since 1949, five additional motels in Statesboro have used electric heating throughout. And four of them have added rooms, using electric heating again, which further emphasizes how satisfactory it has proved. Operating costs have ranged around 25 to 33 cents per night during the coldest months. This is considered by operators a very reasonable price to pay for a clean, safe, silent, trouble-free heat that satisfies the individual requirements of each guest.

Where local rates are higher or the climate colder, operating costs can still be held down to a very reasonable level by weather-stripping and insulating more

*Mr. Townsend is president Dixie RAYdiant Electric Heat Corp., Atlanta, Ga.



The upper photo shows a ceiling type radiant glass heating panel suitable for motel use. Center photo shows recessed wall panel directly under window and air conditioning unit. At bottom, a wall unit with a protective wire grill such as required when bed or other furniture may be moved close to glass panel.

thoroughly. There are additional savings in that rooms not rented do not need to be heated or cooled. And if a cold-natured tourist wants heat in May or September, he has individual heat at his fingertips, eliminating the necessity of starting up or reversing the whole central system to satisfy the demands of one guest.

The individual thermostatic control in every room is perhaps the greatest advantage of electric heat, as it is for individual room air conditioners. No matter how elaborate the central system, it cannot have the same degree of individual control or flexibility. The latter is especially important in spring and fall when owners have found that heating is called for on one day and cooling on the next, or even both in a 24-hour period. Only the combination of individual electric heat and room air conditioners gives such true instant flexibility.

Moreover, because of the balanced load the use of both electric heating and air conditioning gives, electrical contractors will now find that the power companies understandably join with considerable enthusiasm in trying to convince a motel owner that the electrically heated court is best. And the water heater business is also automatically obtained as well as the range if the motel includes efficiency kitchens.

Cost of installing

As to installation costs, there is practically no competition in regard to the many motels already built which are being forced for competitive reasons to convert over to a more acceptable form of heating and to provide air conditioning. Faced with the much more costly installation of a central plant, ducts, pipes, etc., the average owner of an existing motel will appreciate the simplicity and reasonable cost of just running heavier wiring and thereby solving both his winter and summer problems. He saves money in almost every instance.

He is also not faced with the problem and large cost of doing the whole court over at one time. Instead, he can improve his heating and cooling in a few rooms at a time by providing initially sufficient electric service entrance and feeder panel for the whole job.

With electric heaters now available that simply mount on the surface of the wall or ceiling and room conditioners that fit on a window sill, no extensive alterations, cutting of the walls, lowering of ceilings, etc., are required. In fact, in most rooms the electric heat and air conditioning can be installed without the slightest marring of existing paint, truly an advantage to a court which loses six to eight dollars every day a room is out of service.

Advertising value

And after several rooms are so equipped, the court can advertise "air conditioned rooms" and "electric heat." Those tourists who insist on these modern improvements can be taken care of, and the unimproved rooms can be rented to others who are not so particular.

In regard to motels to be built, the cost saving will still be substantial in most instances, particularly if less than 30 or 40 rooms are to be built at the start. And the owner can add rooms later without having to purchase an oversize heating plant initially, thereby tieing up less capital if he goes all-electric.

No furnace room

Moreover, he can omit from his plans provision for a furnace room. This is not only a substantial saving, but it also eleminiates the noise problem, a very real one as to the one or two rooms adjoining the furnace room.

With every available minute needed to handle guests and run the operation, the elimination of a large central plant, its maintenance and operation, is something the motel operator appreciates. And if there is equipment trouble, it affects just one room rather than the whole court. With electric heaters now available with no moving parts, maintenance is reduced to practically zero.

There is still another argument in favor of electric heat. In those rooms with two double beds and more than average furniture and windows, resulting in very little available wall space, there is radiant electric heating in the form of ceiling cable, ceiling rubber panels, or ceiling glass panels which of course take up absolutely no wall space at all.

Exemplary courts

Numerous complete motels are demonstrating the wonderful even heat which is obtained with these comparatively new forms of electric radiant ceiling heat. And operating costs have been no higher, because the heat is radiated downward. An example of ceiling cable heat is the 50 unit Oaks Motor Court, at Greensboro, N. C., which is served by Duke Power Company. Examples of courts using ceiling glass panels, to name just two, are the 32-room Flamingo Motel, at Selma, Ala., served by Alabama Power Company, and the 28-room Miami Court, at Baxley, Ga., which is served by Georgia Power Company.

Finally, sleeping in a room with a clean, quiet, safe electric radiant heat of the modern, improved type with his own individual separate wall thermostat makes the occupant feel that the motel owner has provided the ultimate in luxury and comfort.

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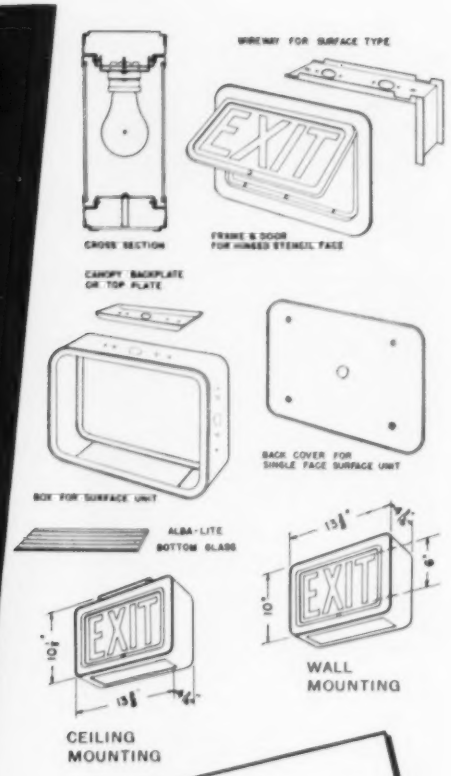

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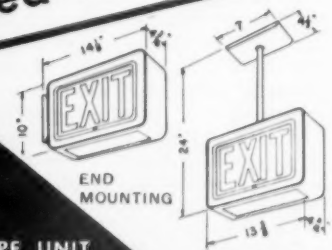

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Contractor's sales program for selling electric heat

J. Noble Crump, president of Dixie Electric Co., Montgomery, Ala., believes in training as the basis of electric home heating salesmanship.

by Robert Latimer

◆ MERCHANDISING electric home heating installations successfully is a matter of excellent training, according to J. Noble Crump, president of Dixie Electric Company, in Montgomery, Alabama.

During the year past, the long established Dixie Electric Company organization has gained substantial ground in sales of both radiant and panel type electric heating, taking advantage of several natural assets in the process.

Dixie Electric Company combined newspaper advertising, "testimonial" promotion, and personal salesmanship to make a resounding success of its 1954-1955 electric heat campaigning, primarily because, as Mr. Crump put it, "people are becoming sold on electric heat as well as air conditioning."

Cleanliness proved

The tremendous upsurge in the installation of residential air conditioning of both the central and package variety has opened the eyes of the average home owner to the fact that electricity is a clean, always reliable source of living comfort which can scarcely be matched by any other medium, and that even where the expense of electric heat is undeniably higher, the advantages such as safety, unwavering reliability, etc., offset the difference in cost.

"The natural assets which have aided us consistently in selling this market have been a decrease in the cost of electricity which makes our rates compare favorably with those in any part of the country, and a contiguous increase in gas costs," Mr. Crump pointed out. "Added to this is the fact that many suburban dwellers, and farm-area home owners are weary with the disadvantages of coal-stoker heating and with liquified petroleum gas. Any prospective home owner in the process of constructing a new dwelling is a logical prospect for electrical heating today, providing that he is contacted soon enough and that the presentation is well handled."

The number one source of prospects in this connection, advises Mr. Crump, is the new home builder specializing in homes built to the future owner's specifications. Wherever Dixie Electric Company has successfully bid the contract for the basic wiring in any home, an effort is likewise made to contact the future owner as early as possible in the construction stage to discuss the possibility of incorporating electric heat.

Offering the customer his choice of radiant heating installed in the walls, or a variety of fan-equipped panel units, Dixie Electric Company has been able to successfully sell some 15 owners of better priced homes in the Montgomery area on one or the other.

The sales tool which has shown major effectiveness is simply the "testimonial system" whereby each home owner who has installed electric heat serves as the stepping stone to the next prospect. By asking the co-operation of the previously sold customer in expressing his satisfaction with the system to new prospects, Dixie Electric Company has obtained the most valuable type of "testimonial."

Customer-salesmen

Where it is possible, arrangements are made in the former customer's home to bring the new prospect around to point out such refinements in heating as the voltage and load regulator which insures smooth, even delivery of power to the heating units, safety circuit breakers, fireproof installation methods, as well as the efficient job which is done.

In one instance; a single radiant heating job which followed stand-

(*Continued on page* 110)

Electrical space heat is

◆ A CHANGE OF CLIMATE in the form of electric utility company attitude toward electric space heating for homes gives promise of a widening market for this electric service which has already become so well established in the Tennessee Valley area.

The rapid growth of air conditioning loads, in the South and Southwest especially, has given many of the electric utility companies a summer system peak; and where many companies viewed electric heat with disfavor a short time ago, they now look to it as an important factor in smoothing out the annual load curve.

Typical of this change in attitude, one large southern company recently held a two-day, statewide meeting on electric heating which featured the various types of heating and provided time for a number of manufacturers to present features of their equipment to wholesalers, electrical contractors, and architects and engineers in attendance.

The rapid growth of electric space heating in the TVA area has given impetus to the growth of this important service in other areas of the South and Southwest and there exist good examples of electric heating in practically every state. A recent survey indicates that approximately 75 per cent of the electrical wholesalers in the South are handling some type of electrical heating equipment, and it now appears that the change of attitude of the electric utility companies will assure a considerable increase in this application of electric service in the immediate future.

Guides available

A number of electric utility companies in the South already have issued mimeographed or printed manuals designed to help their customers get well-designed electric house heating installations. Further indication of the interest in electric house heating equipment at this time is shown by the organization of a new section of the National Electrical Manufacturers Association, which will be called the Electric House Heating Equipment Section. The scope of the section includes the following types of heating equipment principally used in homes and which use electricity as the heat source: (1) cable units for installation as radiant heating systems; (2) radiant panels either of glass or other materials with or without thermostats or other accessories; (3) floor standing panels or screens, which are adaptations of radiant panels; (4) wall heaters of convection type, natural, or fan forced; (5) electrical floor furnaces, baseboard panels, and electric steam radiators. Some 18 or 20 manufacturers of such equipment became members of the NEMA section when it was organized in May.

In those areas where electric house heating systems have already gained considerable importance, the electrical contractor has been the principal factor in their sale and installation. However, the electrical supply wholesalers have played an important part also, and their part in the distribution and application of this equipment was emphasized in a talk before the recent annual convention of the National Association of Electrical Distributors by Ed Goff, chairman of NEMA's new Electric House Heating Section. Mr. Goff said that the importance of properly designing and installing electrical heating systems could not be understated, and he urged that sufficient insulation and careful heat loss calculations be made in order to give customer satisfaction and heating

practical and economical

comfort and keep the operating cost at a reasonable level.

Trained men essential

Mr. Goff urged distributors to have a man sufficiently trained to be able to assist electrical contractors in calculating heating installations. He stressed that the calculations such as heat loss, type and capacity of electric heating equipment is not complicated and does not require an engineer. Manufacturers all issue computation and installation manuals which make it possible for a man with brief training to properly design electric heating installations, he claimed. In addition, Mr. Goff announced that the NEMA section is working on a manual covering design requirements which will be available as an industry standard. In many areas, utilities are equipped to assist contractors and distributors in making the required calculations.

One of the leading promoters of electric heating is the American Gas and Electric Co., which sells electric service through its subsidiaries in Virginia, West Virginia, Kentucky, and Tennessee, as well as some other states. Their entire promotion is being undertaken on the basis of existing rates of the company, the power for this heating generally costing about one and a half cents per kilowatthour. The company has announced as its aim to have over 100,000 complete house heating installations by 1960.

Heat costs budgeted

Another company which has adopted an aggressive electric house heating promotion plan is Union Electric Co., of St. Louis, Mo. Both the American Gas and Electric Co., and the Union Electric Co., have recently announced budget payment plans for electric space heating users which will spread electric heating costs over a ten-month period. This plan enables the householder to budget heating costs throughout the year rather than to have two or three relatively high bills in the coldest winter months.

Both of these companies, as well as several others, have issued guides on electric house heating. A number of power companies are training sales personnel to carry on the promotional, engineering, and educational work necessary to promote electric heating properly. Their program includes assisting distributors, dealers, architects, and builders, and to acquaint them fully with the availability, advantages, and performance of electric heating equipment.

These utilities are co-operating with manufacturers by carrying on customer educational meetings, displaying equipment, and otherwise assisting in promotional activities to sell electrical heating properly. Their ultimate aim is to bring the truly all-electric home into actuality.

Electric space heating has been in use for many years to a limited extent in many areas and has been widely used for supplementary or auxiliary heating. The latter type generally represented one or two portable heaters that could be used during early fall or late spring when small amounts of heat were needed, or as supplementary heaters in certain spaces not adequately heated by the existing house heating system. Bathroom wall type heaters have been installed in many homes because of the added comfort and convenience obtained from such units.

Contractors' stake in heating

The trend toward complete electric house heating systems gives the electrical contractor a definite stake in this field because the

equipment suitable for this type of heating is definitely not an "across the counter" item. Some types of equipment available are more suitable for installation in existing homes, but the installation of electrical heating equipment for entire houses will definitely require special wiring as well as some knowledge of insulation techniques, calculation of heat losses, etc.

Electrical contractors will definitely find it to their advantage to gather data on electrical house heating so that they can capitalize on this modern trend.

Those electrical contractors, who have had little interest in wiring of homes because of the small size of the job, may find that the addition of electrical heating to the conventional needs in the home will increase the size of these installations to where they compare favorably with small commercial jobs.

There are still a few people in the electrical industry who think that the relatively high cost of electrical heating in comparison with some fuels is a stumbling block to the widespread use of electrical house heating. However, experience in those areas where electric house heating has been accepted by the public and has achieved a high percentage of saturation indicates that the advantages of electric heat are so tangible that the cost of operation has not been a disturbing factor in the promotion and sale of electric house heating installations.

Advantages of electric heat

Among the advantages that seem to be well recognized are these:

The first cost of electric house heating equipment is very often less than conventional heating systems.

Because electricity can be controlled more easily than any other type of fuel, electrical heating installations are generally more completely automatic, result in more even temperatures, and generally have a higher degree of safety.

Because electric house heating equipment results in no products of combustion, such as soot, smoke, or dirt of any kind, it is found to be cleaner than other types of heating systems.

An important factor is the space saving of electric house heating. Since most units are installed either in the wall or on the ceiling, there is no floor space taken up by heating equipment and this allows more freedom of furniture arrangement. In the case of some conventional systems, the actual space occupied by central heating plants and ducts is very often a substantial percentage of home area.

The nature of electrical heating equipment is such that all of the electrical energy consumed by such units is instantly converted to heat. This permits rapid heating of areas, and because of the small storage capacity involved, permits the heat to be cut off immediately when proper temperatures have been reached so that there is no overheating. The simplicity of electrical heat and the possibility of using unit controls for each room permits other economies since each room or zone can be individually controlled to the required temperature to suit the particular use of the room.

An important factor in the favor of electrical house heating equipment is its low maintenance cost. Faults in such systems occur infrequently and because a large number of electrical house heating systems use individual room heating, the entire system will never be closed down for repairs.

Because of the special considerations involved in planning and installing electrical house heating, the electrical contractor and electrical wholesaler who hope to participate actively and profitably in this field, should train some individuals in their organization in the special knowledge involved. First of all, house heating specialists will need to know something of the fundamentals involved in electric house heating, including certain technical considerations, technical terms involved, and the general understanding of heat losses of dwellings of various types.

In addition to these fundamentals, the electric house heating specialist should have a working understanding of the principals of thermal insulation and some knowledge of the special considerations involved with the various types of installations.

Finally, the electric house heating specialist will need to be familiar with the various types of electric heating systems that are available on today's market, and to know something of the advantages and disadvantages of each as well as the special requirements and considerations involved.

Basic types of heating

One general type of electric house heating equipment consists of the resistance or convection type of electric heating. This corresponds to the type of electric heating that has been on the market for many years represented by small portable or wall-type heating units. Many of these units actually involve a combination of radiant and convection heating. Some designs also utilize fans in order to speed up the convection heating of the air for faster heating effect.

Panels prove popular

Another type of electric house heating equipment which is growing in demand utilizes radiant heating panels. In the case of this type of equipment, the heating effect is almost all radiant heating with a minimum of convection type heating. There are a large number of units available making use of glass heating panels, also ceramic panels, and more recently another type of radiant panel has been made available consisting of conductive rubber. These various types of panels can be installed on or in the walls or ceiling.

An important type of electric house heating equipment consists of the resistance cable which is generally stapled on the ceiling and then plastered over. With the ceiling well-insulated above, the heating cable radiates heat downward into the room. Installations of this type are generally installed with individual thermostat control for each room.

A fourth type of electric house heating is the forced circulation system which consists of an electrical resistance type unit over which air is forced by means of a fan. Units of this type are available as central type units more or less paralleling the average central type warm air heating system. The fan forces air over the heating coils, circulating warm air throughout the rooms which are heated. More recently this type of system has been developed in room type units which heat and recirculate the air within a single room, each room unit being controlled by a separate thermostat.

A fifth basic type of electric house heating equipment is the heatpump. This device is generally in the form of a refrigeration unit which can be used for air conditioning but which is provided with suitable valves and controls to permit it to operate as a reverse cycle heating unit. It differs from the previously mentioned units particularly in operating economy

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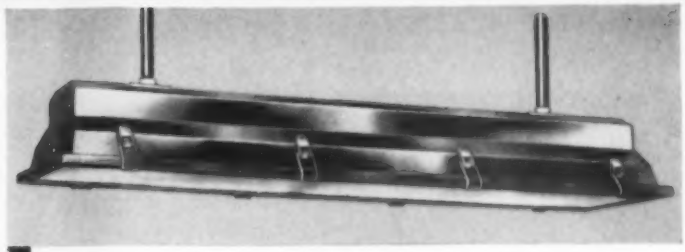

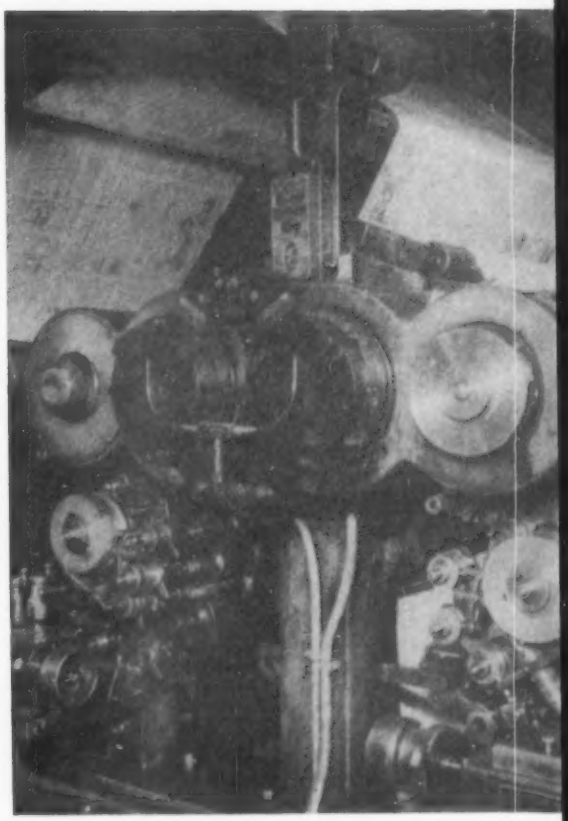

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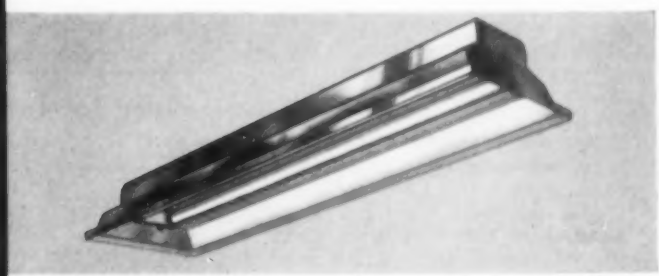

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for whereas the resistance type convection, radiant and forced circulation type of electric house heating equipment each derive only 3,415 British thermal units of heat from each 1,000 watt-hours of electric energy consumed, the heat pump will liberate in the heating system approximately 13,600 Btu for each 1,000 watt-hours of electric energy consumed.

The articles which follow will serve as a broad outline of the information which the electric house heating specialist should understand. It will give him the principal facts about electric heating, and the information can be expanded by reference to manuals published by the manufacturers on the application of their particular equipment, electric house heating guides and manuals published by utility companies, and a variety of textbooks available, including the Heating, Ventilating, and Air Conditioning Guide published by the American Society of Heating and Air Conditioning Engineers.

Heating costs reasonable with proper insulation

◆ THOUSANDS OF PRACTICAL electrical house heating installations, located in areas other than the low power cost TVA area, prove that homes can be electrically heated at reasonable cost. A very large number of electric utility companies have residential rate schedules that result in electrical heating energy being billed at 1½ to 2 cents per kilowatthour. Experience proves that electrical heating systems in well-insulated houses, served at such rates, will result in heating bills that are not excessive and, as a matter of fact, are entirely competitive with other fuels when consideration is given to all the factors involved.

However, good insulation is essential if electric service bills are to be kept within reason. Because the cost of insulation is small in comparison with the extra power cost that will be incurred for heating over a period of years if it is not installed, the insulation is entirely justified on an economic basis alone.

The following example illustrates how the heating capacity, and thus the energy consumption, is reduced for an average house as insulation is improved.

Consider a single-story house of 1400 square feet floor area, of frame construction, with two weather-stripped doors and 16 weather-stripped windows, in an area having a design temperature of zero degrees F. With no insulation, the heat loss of this house is 114,000 Btu.

By insulating the ceiling with four inches of mineral wool, or its equivalent, the heat loss would be reduced to 79,000 Btu. By adding two inches of mineral wool or equivalent as insulation in the walls, the heat loss would be reduced further to a total of 68,000 Btu. By adding storm windows and doors, the heat loss would be only 57,000 Btu, or exactly half of the original heat loss of the uninsulated house. Finally, by adding two inches of floor insulation, the heat loss would become 44,000 Btu or a little over 1/3 of the original heat loss of the house.

The reduction in heat loss is *not* directly proportional to the thickness of insulation added. For this reason, there is an economic limit to the value of insulation, and in most instances it will be found unprofitable to go beyond four inches of mineral wool or its equivalent of other types of insulation. Step-by-step calculations show that the first inch of insulation will result in a reduction of approximately 55 per cent in heat loss. Two inches of insulation will result in an additional 15 per cent reduction in heat loss, while a third inch of insulation added will save only 8½ per cent of the original heat loss. The fourth inch of insulation added will save another 4½ per cent.

Thus it will be seen that the two inches of insulation in the walls and floor will reduce heat loss by 70 per cent, but since the air is hottest near the ceiling with most types of heating systems, four inches of insulation is well-justified in the ceiling since it will reduce the heat losses through that area by 83 per cent.

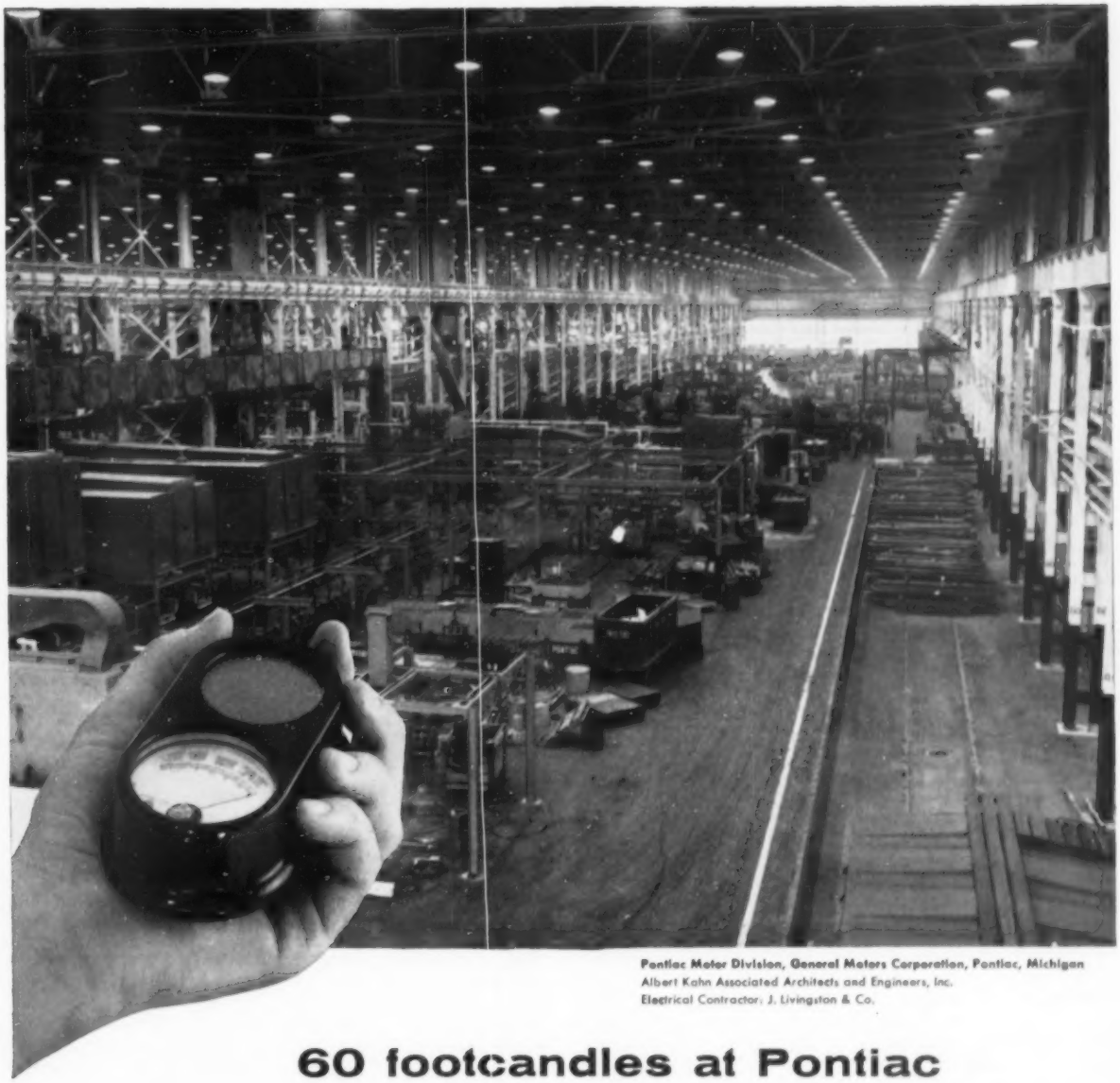
The cost of electric space heating is affected by so many factors that it is difficult to generalize, but the following discussion will give some idea as to heating cost in the South in a well-insulated house.

A six room house, located in Montgomery, Ala., is heated by 11 1,000-watt radiant glass panels. The living area covers 1,300 square feet and is completely insulated. In addition to ceiling insulation, this home has aluminum foil triple layer reflective insulation stapled in the outside walls in between the studs and also under the floor between the joists. The average monthly winter electric bill for this household runs between $20 and $25, of which the owner estimates that $7 to $10 is the energy

(*Continued on page* 62)

Total Floor Area of Heated Space (Sq. Ft.)	500	750	1,000	1,250	1,500	2,000	2,500
Total Volume of Heated Space in Cubic Feet—(8 Ft. Ceiling)	4,000	6,000	8,000	10,000	12,000	16,000	20,000
Minimum Heat Loss *(3.5 BTU/hr./sq. ft.)	14,000	21,000	28,000	35,000	42,000	56,000	70,000
Minimum Capacity of Heating System	4.1 kw	6.2 kw	8.2 kw	10.3 kw	12.3 kw	16.4 kw	20.5 kw
Kilowatthours Required For Heating	5,500	8,250	11,000	13,750	16,500	22,000	27,500
Heating Cost	$99	$147	$195	$243	$291	$388	$484

This chart reproduced from the electrical heating guide published by Union Electric Company of Missouri, St. Louis, gives some idea of the cost of electric heating in the upper portions of the South and Southwest. The chart is based on 8-foot ceiling height and 70 degrees F. maintained in the heated rooms. Higher ceilings and inside temperatures would increase the cost.



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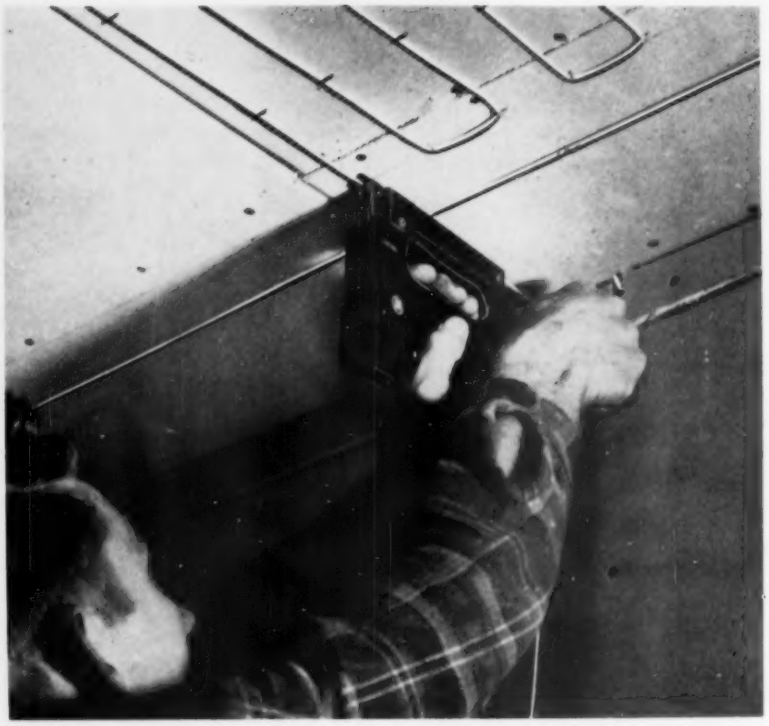
Radiant heating with electric cable

◆ ELECTRIC HOUSE HEATING systems making use of electric radiant heating cable may take several different forms. For the most part, such installations consist of radiant heating cables stapled to ceiling plaster board, with the heating cables then completely plastered over. To a lesser extent, radiant heating cables are installed in dry-type ceiling construction and in concrete slab floors.

The heating cables themselves are available in various wattages ranging from about 300 watts to as high as three or four thousand watts. Most manufacturers use a color coding system to identify the wattage. The different wattages are obtained by varying the length of the cable and impressing either 120 or 240 volts.

In applying radiant heating cable to a given room, the first step is to determine the wattage required to properly heat the room. Many of the heating cable manufacturers provide application manuals which include data and charts that will enable the electrical contractor to select the proper wattage cable for a given set of conditions with a minimum of mathematics and numerical computation.

Because most electric utility companies are especially interested in ascertaining that jobs are properly designed and that they will give the customer good service, these companies maintain electric heating counselors who will help the electrical contractor calculate heat losses and figure the capacity in kilowatts needed to heat the house. Also some of the manufacturers are willing to prepare design data for a given house, if the contractor will submit plans with complete information as to insulation to be installed, etc.



Heating cable stapled to ceiling and plastered over has become one of the most popular methods of heating homes electrically. (Ceilheat photo)

Factors affecting heat loss

In general, the wattage required will depend upon the size of the room, the glass area, the type of insulation in walls, floor, and ceiling, the number of exposed walls, and the design temperature, that is, the lowest outside temperature for which the heating system is designed to provide comfortable conditions.

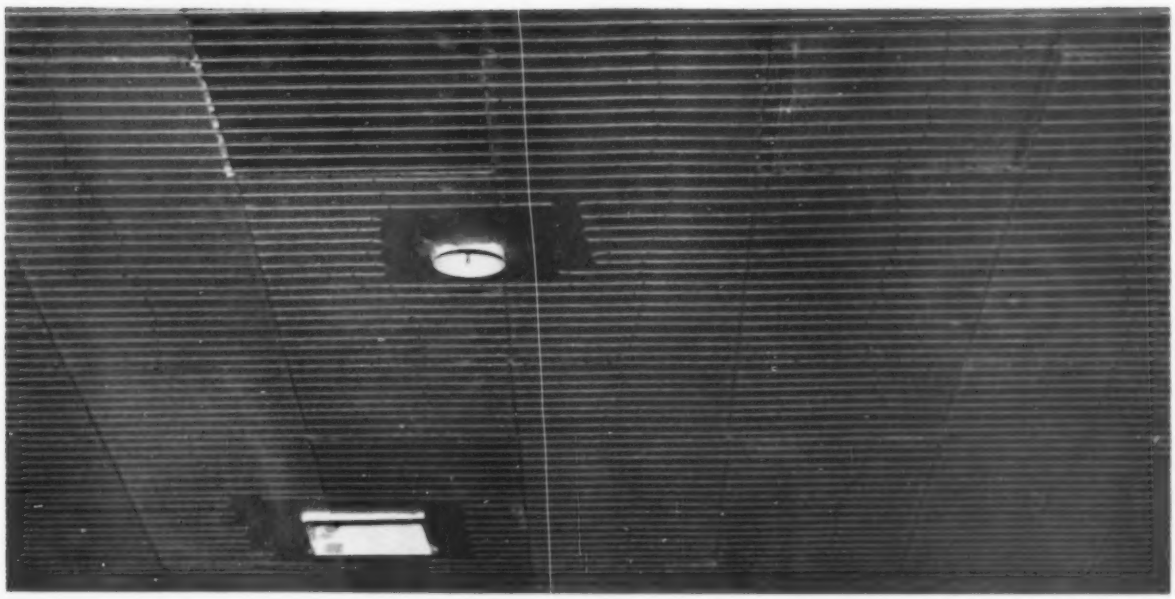
A typical chart for determining heating kw required for a given room is shown in the accompanying illustration. This chart is based on insulation equivalent to six inches of mineral wool in the ceiling, 3½ inches in the walls, and 2 inches in the floor. This chart is also based on a room having one exposed wall and for a design temperature of 0 degrees F. A similar chart is available, for example, for a room having two walls exposed, and heating kw required for design temperatures other than 0 degrees F. can be determined by obtaining the kw from the chart, and then applying a correction factor to adjust the value for a higher or lower design temperature depending upon the locality.

As an example, consider a room having 200 square feet of floor area and approximately 50 feet of glass area. A vertical line is erected from the base of the chart at the point reading 200 to the point where it intersects the horizontal line represented by the number "50." The point of intersection falls between the diagonal lines at a point that would represent approximately 2.3 kilowatts. A heating cable having this wattage, or as close to it as possible, would be selected for installation in this room.

In this instance, we may assume that a 2500-watt cable would be selected having a length of approximately 910 feet.

Spacing of cable on ceiling

The next problem in the application of the heating cable would be to determine the proper cable spacing. Since the length of heating cable used will vary with factors other than the room size alone, it is necessary to tabulate the proper cable spacing in inches in order to

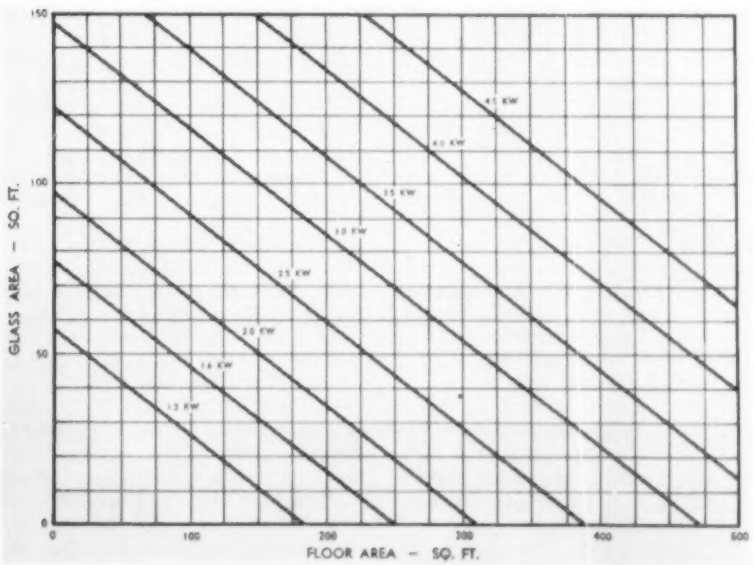


Among the advantages of radiant heating cable is its flexibility and even heat. It releases floor and wall space and simplifies furniture arrangement. This is a good example of how cable is applied. (Tenn. Plastics photo)

distribute the length of the heating cable evenly over the entire room.

A simple method of determining the proper spacing is to subtract one foot from the length of the room and from the width of the room, respectively; multiply these two dimensions; and divide by the cable length. Of course all dimensions must be in feet.

As an example, for a room measuring 14 feet by 10 feet, and requiring a heating cable 545 feet in length, we would multiply 13 by 9, getting a result of 117. Dividing 117 by 545, we would obtain a cable spacing of .213 foot or 2.58 inches.



Typical of application data available from manufacturers is this chart showing a short cut method of determining heating capacity required. This particular chart is based on well insulated room, one wall exposed and assumes a design temperature of 0 deg. F.

Installing the cable

The installation procedure is as follows. Select a thermostat location and nail junction box in place about five feet above floor. Then drill two holes through wall plate above the thermostat location and two holes through the ceiling lath six inches out from the wall above the thermostat location. The non-heating lead wire attached to the heating cable is inserted in non-metallic loom for a length of about eight feet and this loom is extended through the hole in the ceiling lath, then through the hole in the wall plate and down to the thermostat junction box. About six inches of non-heating lead is pulled in to the box for connecting purposes.

The non-heating lead is securely fastened to the surface of the ceiling with a stapling machine and any excess of the heating lead is extended along the ceiling and encased in plaster just as the heating cable. Extend the heating cable along the ceiling six inches out from the wall to an outside wall then loop the heating cable back parallel. Always keep the heating cable at least two inches away from metal corner lath or other metal reinforcing.

Most applicators of radiant heating cable use 1½ inch spacing be-

tween cable runs for the first two feet nearest an outside (cold) wall, with the balance of the required cable being installed in the rest of the room evenly spaced and extending to within six inches of the other walls.

It is recommended that when the wire is looped for the return parallel run, the cable be stapled six inches from the turn and then stapled again three inches from the turn, as well as at the turn, in order that the staples at the bend do not have to support the cable.

In applying the cable to the ceiling, a clear space about 21 inches square should be left around the outlet for a ceiling lighting fixture.

Some of the cable manufacturers mark the halfway point on the heating cable by an identifying mark which proves helpful in getting the cable evenly distributed upon the ceiling. When the halfway mark is reached, the installer can check his position and then adjust the installation so as to come out right.

The return end of the cable is brought back to the starting point and extended in loom through the second hole in the ceiling lath and through the wall plate down to the thermostat junction box.

A special word of caution is necessary with respect to connecting the cable to the proper voltage. All manufacturers use tags or other markings to plainly designate whether the cable is designed for 120 volt operation or 240 volt operation. If a 120 volt cable should be connected to a 240 volt circuit, the insulation on the heating cable would be damaged, making it necessary to replace the cable.

Check work as completed

It is also important that each cable be checked with an ohmmeter or ammeter for continuity and capacity after the cable installation has been completed, and before the cable has been plastered over. Sometimes a break in the wire is difficult to locate when the insulation pulls the wire ends back together into contact. If the meter is left connected to the cable while a broom is run lightly over the wire, such breaks will generally be shown up.

It is also recommended that another test be made right after the brown coat of plaster is completed by connecting the ohmmeter between the heating element of the wire and the plaster itself. If the resistance is less than 100,000 ohms, the wire insulation is probably damaged and the bad place should be located and repaired at once.

The plaster installed over the cable is an important part of the finished job and this phase of the installation must be watched carefully by the heating engineer in order to make certain that the finished job will be entirely satisfactory.

Some points to be given special consideration are:

Plastering instructions

The plasterer should use fresh plaster and clean sand and have all batches of plaster carefully meaured and well-mixed. An insulating type aggregate should never be used over radiant heating cable, but may be used on side walls.

The scratch coat of the plaster is applied in the direction of the cables—never across the cables—so as not to change their relative position. The base coat plastering is generally applied in one or two coats and in sufficient quantities to cover the cables with ⅝-inch thickness, the total thickness of the base coat being the diameter of cable plus ⅝-inch of plaster.

No plaster should be applied while the heating cable is energized. Do not apply heat in cables until plaster is dry. Increase the heat gradually when first turned on, bringing the system to operating temperature gradually over a period of one week.

The subject of plastering over radiant heating cables is well covered in a "Manual of Gypsum Lathing and Plastering," published by the Gypsum Association.

Long-life and simplicity make wall units popular

◆ A VERY CONSIDERABLE number of electrically heated homes utilize either radiant heating panels or unit heaters which may be considered as a combination of radiant and convection type heaters.

These unit type heaters are available in a great variety of sizes and designs. The radiant panels include both glass panels and ceramic type panels, and these may be obtained for wall mounting, baseboard installation, or ceiling type units. The wall units may be designed either for surface mounting or flush mounting and the various units may be obtained in several different wattages.

In the case of the combination radiant and convection type heaters, there is practically no limit to the variety of sizes and shapes available. Some of these units utilize the radiant principle more than convection, while others include fans to drive the air over the heating elements, thus greatly increasing the convection effect in proportion to the radiant effect.

In applying this type of heating equipment, the heating engineer will usually calculate the wattage needed to heat the entire house and then allocate this heating capacity to the various rooms, checking each room installation by calculating its individual heat loss. Each room is generally put under separate thermostat control.

Accurate calculations needed

In applying unit type heaters of this nature, the heating engineer will find that it is much more important to calculate heat losses accurately. In the lines of most manufacturers, the wattage jumps from one size unit to the next will be substantial. For example, in the case of radiant glass heating panels, a manufacturer may have available a 1,000-watt unit and a 1,500-watt unit. A particular design may call for two units to each room and the engineer will therefore have a choice of two 1,000-watt units, a combination of a 1,000-watt and a 1,500-watt unit, or two 1,500-watt units. His heating capacity will therefore be available only in steps of 500 watts. If his heat loss calculations are made with a high degree of accuracy, he may be able to save considerably in wattage installed and thus reduce the cost of installation as well as the kilowatt demand that will be imposed upon the distribution lines of the electric utility company.

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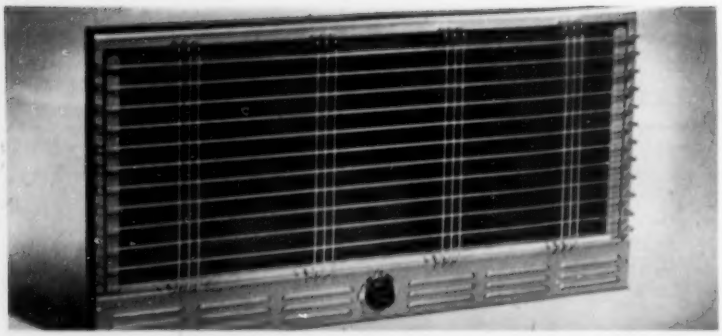


Production of radiant glass heating panels has progressed to the point that a variety of sizes and wattages are now available. Upper photo shows a 1500-watt panel with snap action thermostat and neon pilot light. (Berko photo) Below, a "Slimline" 1000-watt panel suitable especially for mounting under picture windows. (Dixie Raydiant photo)

In rooms such as living rooms, where heat will be needed most of the time the room is occupied, maximum satisfaction will be obtained by locating the heater on or near an outside wall. In bedrooms, where heat may be desired only part of the time, maximum satisfaction may be obtained by locating the heater in or near the area used for dressing.

Baseboard type electric heating units, available in radiant glass as well as resistance type wire units, are especially advantageous for large rooms of odd shape since they permit the heating capacity to be distributed over a large area.

A particular advantage of radiant heating panels or the combination radiant and convection heating units is that they can be installed in old construction as well as new without requiring major redecorating such as would be the case with the installation of ceiling type radiant heating cable in an existing home.

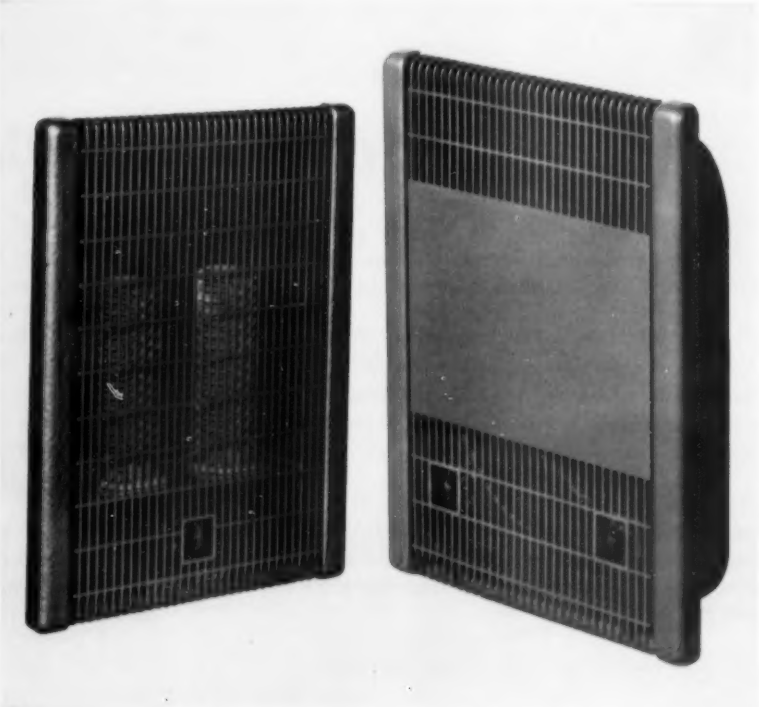
Another advantage of this type of heating is the fact that there is relatively low storage capacity and the heating effect is felt almost immediately after the units are energized.

Unit electric heaters utilizing resistance type units are generally available in higher wattage ratings than is the case with radiant glass panels. One manufacturer of resistance type wall heaters, for example, has a line which includes models rated at from 1,250 watts up to 8,000 watts.

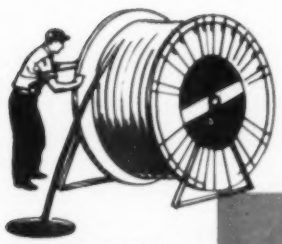
In smaller rooms, where heat loss is low, it may be possible to provide the necessary heating capacity with a single low wattage heater. However, in larger rooms having more than 200 square feet of floor area, it is generally best to use more than one unit, utilizing two or three unit heaters of lower capacity adding up to the proper kilowatts of heating capacity required. Also, where a room has an odd shape, such as often results from combining living and dining areas, more than one unit should generally be used.

Location of heaters

The location of heating units in any particular room is determined by the design of the room and the purpose for which the room will be used. They should be placed to provide the maximum convenience with proper allowance for furniture location.



At left, an electric wall furnace, available from 1250 to 8000 watts, with thermostat and lockout switch. At right, electric wall furnace with fan for forced air convection heating. (Wesix photos)



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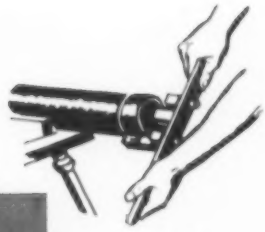

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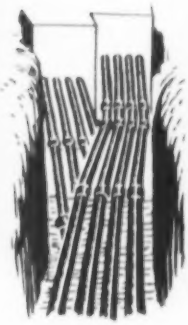

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U. S. Rubber Photo

Fabricated radiant panels utilize conductive rubber

◆ ANOTHER TYPE of radiant heating equipment for homes and other occupancies comes in the form of prefabricated electrical heating panels which are attached to walls or ceilings. These panels include a layer of conductive rubber which carries the electrical current and generates heat at the rate of 75 Btu per square foot of panel area.

These heating units are available either as sheets or panels. The heating sheets have a layer of conducting rubber sealed between sheets of insulating paper. The assembly is covered on each side with a sheet of aluminum foil and the finished sheets are approximately 1/16-inch thick. They are available in standard sizes of 4 feet by 6 feet, 4 feet by 4 feet, and 3 feet by 4 feet.

The panel type units are formed by sealing a layer of conductive rubber betwen layers of insulating papers, and this assembly is made rigid by a backing of 3/16-inch asbestos board. The finished panel is approximately ¼ inch thick and presents the same appearance as standard interior wall board. The standard sizes of rigid panels are 4 feet by 4 feet, and 3 feet by 4 feet.

These panels are ordinarily operated at 230 volts, but they may be obtained for operation on 115 volts. The panels have an output of 22 watts per square foot.

This type of heating panel, when supplied in sheet form, is attached to the ceiling or wall with a special adhesive supplied by the manufacturer. The panels may be applied to plaster, plasterboard, or similar smooth ceiling surfaces, whether painted or not.

The flexible sheets have a small terminal board connected at one corner, and the panels are wired by extending a small metal raceway to the terminals. A small metal molding covers the terminal blocks and all wiring is completely concealed within the molding.

The rigid type heating panels are fastened to the ceiling with screws. A 1½-inch fastening margin is provided around each panel for screwing to adequate framing members on all four sides.

These rigid panels have a standard 4-inch junction box attached to one corner to enclose the electrical connections. This box is located in the back of the panel above the ceiling and none of the wiring shows in the room below.

In a typical room with 8-foot ceiling heights, this type of panel will result in air temperatures near the ceiling of 100 degrees. This will decrease to about 67 degrees at a point five feet above the floor while the temperature of the air at the floor surface will be about 70 degrees.

Units of this general type have been used successfully for complete home heating, for office and apartment heating, for commercial and industrial heating, and for heating of single rooms such as bathrooms, sun porches, game rooms, etc.

Circulating

◆ CIRCULATING WARM AIR heaters are available for electrical operation and closely parallel the operation of conventional type warm air systems, but incorporate the advantages that accrue through electric operation such as simpler control, individual room control, elimination of fuel combustion with problems of fumes, smoke, soot, etc.

This classification of electric heating equipment includes both gravity type circulation and forced air circulation. For example, electric floor furnaces are available from one manufacturer in sizes varying from 3 kw to 8 kw, designed for mounting between floor joists of standard spacing. These units have air spaces surrounding the heater compartment. Cool air from the floor enters the unit at sides and passes over the heating elements after which it rises and circulates in the room returning to the floor as it cools.

To some extent, electrical heating units have been used in central type warm air circulating systems but these units are not favored by electric utility companies because of the higher kilowatt demand generally imposed upon the system. From the users point of view there is less flexibility than with individual room type units, where rooms for different purposes can be operated at the temperatures desired with resulting operating economies.

Distinctive new system

Recently, a warm air circulating type electrical heating system has been introduced by one manufacturer which offers a number of advantages of which small temperature range from floor to ceiling is especially interesting.

The design features of this new type unit and the method of installing is shown in the accompanying illustrations. The unit is designed for mounting vertically between studs in an ordinary partition wall. It consists of a metal duct approximately 7 feet high, 8 inches wide, and 3½ inches deep. There are two openings covered by grilles, one each at the top and bottom.

warm air electric heating systems

Just inside the upper grille, a fan unit is mounted. This is a suction fan which draws off a layer of already warm air ordinarily present just under the ceiling (but usually wasted insofar as its effect is concerned) and sends it down over a heating element located just above the lower grille.

The heating element of the resistance wire type adds the required amount of heat to the air as determined by the thermostat setting. The reheated air then flows out of the lower grille across the floor thus providing comfort in the "living zone" of the room. The manufacturer points out that this system eliminates cold floors—one of the disadvantages of most warm air heating systems using cold air return grilles mounted in the floor.

The units are available in a range of wattages extending from 1,600 watts to 4,000 watts. The larger wattage units are 13 inches wide as compared to the 8-inch width of the lower wattage units.

The units are available either in 6-foot or 7-foot heights.

Methods of installing

In applying this heating equipment, one or more units of the proper kilowatt heating capacity are mounted between the studding of the walls of the room. The walls are then finished over in the usual manner and the only part of the equipment that is visible after the installation are the two grilles at the top and bottom of the unit and the thermostat which projects from the wall about halfway between the grilles. All of the mechanism can be serviced without disturbing the wall after installation. The heating elements can be serviced from the lower grille while the fan can be reached through the upper grille.

In addition to the standard method of installing the units in the wall during construction, these units may be installed as surface type units by providing a simple cabinet for them to be mounted on the wall, after which the room decor or paper is carried on right around the wall and over the cabinet so that it has the appear-

(*Continued on page* 64)

This recently developed warm air circulating electrical heating system is designed to be mounted in walls between studs. Fan draws air from ceiling, forces it over heating elements, and out over floor. (Electrend photo)

Heat pump combines heating with home cooling function

◆ No discussion of electric house heating equipment would be complete without mention of the heat pump which has already been installed in considerable numbers for space heating in homes, as well as in commercial and industrial buildings.

From an economic point of view, however, the heat pump can be justified only where air conditioning is desired as well as electric space heating. In applying heat pumps, the size of the unit is generally selected on the basis of what is required for air conditioning. Then, the heating capacity of the unit selected is supplemented with electrical resistance type units if the design temperature condition is so low as to require more heat than the heat pump will provide.

How the heat pump works

The operation of the heat pump can be understood by comparing it with the ordinary household refrigerator. The general function of a refrigerator is to remove heat from substances that are already relatively cold and to transfer this heat to the air outside the refrigerator which is relatively warm. In the average domestic refrigerator, this effect is accomplished by means of a simple vapor compression system utilizing four principal parts. These parts include a motor driven compressor, a condenser, expansion valve, and an evaporator or cooling coil. The evaporator is the series of coils inside the refrigerator at the point where heat is absorbed, while the condenser is a series of coils on the back of the refrigerator at the point where heat is released into the air.

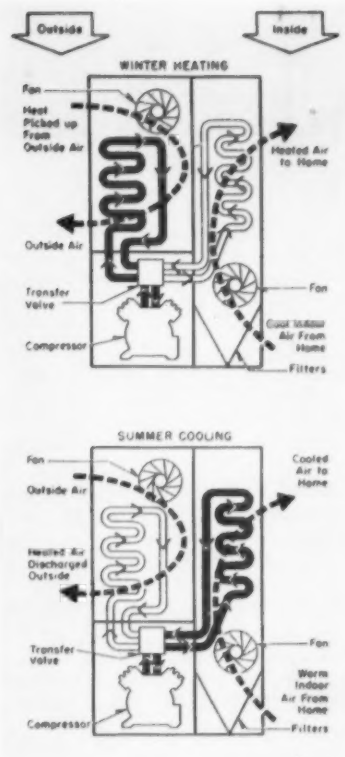
The heat pump includes a compressor and two sets of coils, one representing the cooling coil and the other the condensing coil. However, the compressor is connected to the two coils through a special transfer valve which in effect becomes a "double throw switch" which in one position connects the outside air coil as a condenser and the inside coil as an evaporator or cooler. Adjusting the transfer valve to its other position, the function of the two coils is reversed and the outside air coil becomes the cooling coil while the inside coil becomes the condenser coil.

This change in function is shown graphically in the accompanying illustration showing how a typical heat pump is connected for winter heating and summer cooling.

Actually, the entire operation is fully automatic. Once the desired temperature level is thermostatically set, the heat pump's controls take over. The thermostat may operate the unit for heating in the morning and yet switch over to a cooling operation later in the day when cooling might be required instead of heating.

One of the particular advantages of the heat pump as a source of

(*Continued on page* 109)



These diagrams illustrate how the heat pump transfer valve converts the device from heating to cooling. (Westinghouse drawings)

Modern air-to-air heat pumps are as inconspicuous as a refrigerator or home freezer. The unit illustrated here is designed for flush mounting and can be completely serviced from the front panel. (General Electric photo)

New G-E fuse pullers have as many as four fuse pullers (including main puller) and up to 20 plug fuse branches. Main lugs are rated either 60 or 100 amperes.

Straight-in wiring and slide-out interiors in new G-E fuse pullers simplify job from start to finish

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Installed in two-foot sections, as many units are used in each room as engineering specifications require. A

control panel is coupled into the heating system of each room, allowing room-by-room use and conservation of heat. They can be used in a single room or throughout the house. There are no moving parts. Wiring required for the baseboard heaters is identical with 240-volt circuits normally used for conventional electric ranges and water heaters.

Westinghouse wall model electric heaters, available in 13 different sizes from 1000 to 6000 watts, 3413 to 20,478 Btu/hr, are designed to provide quick, economical heating in bathrooms or other small rooms. They are simple and inexpensive to install and cost little to operate.

The company also manufactures three floor heater models in 2000, 3000, and 4000 watt sizes, 230/240 volts, a-c only, all in brown baked enamel as standard finish.

For additional data, circle item 801 *on the coupon on page* 50.

Tennessee Plastics

A COMPLETE LINE of electrical space heating equipment, in the form of electric radiant heating cables and electric wall space heaters, is now manufactured by Tennessee Plastics, Inc., Johnson City, Tenn. In addition, the company has available such accessories as thermostatic controls, staples, and staple guns.

The Tennessee Plastics line of radiant electric heating cables includes cable for installation in plaster ceilings, as well as cable for use in laminated dry-wall type of construction. The heating cables are available in a wide range of wattages extending from 125 watts to 5,000 watts. The line includes 34 new and different sized elements, making a total of 50 different cables to choose from. All of the "Ra-Heat" cables are listed by Underwriters Laboratories.

Among the special features of the Ra-Heat cable line are: the Ra-Heat spool which doesn't require a bulky reel but will pay off a screw driver; a new dielectric splice between the non-heating lead and the heating cable; a halfway marker in the center of the heating element; the new well-marked individual package for each spool; and nylon jacket on the cables for those who prefer it.

Ra-Heat uses the IA61 radiant heating thermostat manufactured by White-Rodgers Electric Company because of its sensitive differential which is approximately one-half degree F. It has a range of 55 degrees to 85 degrees F., and the dial knob may be turned to "cold" position to obtain a temporary shutdown of the system for short periods of time, such as vacations, weekends, etc.

The "Raywall" line of wall insert heaters, and an automatic portable heater made in silvergrey hammertone, rounds out the line which also includes a surface-mounted heater and a chrome line of bathroom heaters. The Raywall heaters offer these special features: a safety-designed grille slotted so children can't stick their fingers in it, thermostatically controlled, easily disassembled for cleaning, element made of high grade nickel chromium resistant wire and guaranteed for 5 years. The Raywall units are also listed by Underwriters Laboratories.

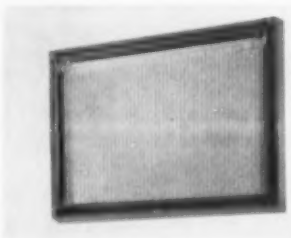
For additional data, circle item 802 *on the coupon on page* 50.

Dixie Raydiant

FOR SIX YEARS distributors throughout the South of electric radiant glass heating panels, Dixie Raydiant Electric Heat Corp., 66 Eleventh St., N. E., Atlanta, Ga., is now offering their own line of glass panel heating. The firm has available for immediate delivery units in 625, 1000, and 1500 watt sizes, with or without built-in thermostats and for surface or recess mounting.

Featured in the Dixie Raydiant line is a versatile 1000 watt model that comes equipped with a 10 foot cord and can be used either as an on-the-wall or portable unit. This unit, designated as Model 1000STP, comes complete with thermostat, and is ideal for use by apartment dwellers, in rented offices, in motels, etc. Keyhole slots make the panel as easy to hang as a picture.

Another item in the Dixie Raydiant line is the Standard 1000 watt surface Model 1000S, which is available in 120 or 240 volts. Overall



dimensions of this unit are 19¾ by 27¾ by 2½ inches.

The Dixie Raydiant line also includes ceiling cable, which is color coded and available in 300 to 3000 watts 120-240 volts for embedding in plaster ceilings, and 358 to 2684 watts, 240 volts, for use with laminated gypsum wallboard ceilings.

Slimline panels, surface panels with wire guards and ceiling glass panels roundout the Dixie Raydiant line.

For additional data, circle item 803 *on the coupon on page* 50.

Electromode

ANNOUNCEMENT of the addition of electric baseboard heaters to their line of electric heating equipment has been made by Electromode Corp., 45 Crouch St., Rochester 3, N. Y. Designed for modern living, these heaters afford low-level perimeter heat that spreads a shield of comfortable warmth against cold walls from floor to ceiling, without drafts or sudden temperature changes. Heat is automatically controlled at the desired level by

YOUNGSTOWN BUCKEYE CONDUIT

HOT GALVANIZED: High quality steel pipe is first thoroughly cleaned by pickling in acid, then immersed in a bath of molten pure zinc. After threading, a coating of tough, transparent enamel is baked on—providing double corrosion protection of zinc and enamel—inside and out.

ELECTRO GALVANIZED: After being threaded, reamed and carefully inspected, this conduit is cleaned by pickling, then uniformly coated outside with zinc. A coat of tough, elastic black enamel is then baked on the interior, providing protection as well as a smooth raceway for trouble-free wire pulling.

BLACK ENAMELED: A protection, black enamel coating is applied inside and out by dipping. When a uniform thickness of this coating has been achieved, it is then baked to form a tight, elastic, high lustre finish—guarding against cracking in bending or forming operations during installation.

ELECTRICAL METALLIC TUBING: Absolute uniformity of weight, wall thickness and concentricity, plus protective outside coating of pure zinc and baked-on elastic enamel interior, forms this modern mirror-smooth raceway. Lightweight, easy to handle, no threads to cut, bends readily and assures safe, economical, life-time electrical installations.

Proven - THROUGH THE YEARS

Yes, Youngstown Buckeye Conduit has been proven through the years by thousands of owners and by leading Electrical Contractors the world over . . . proven that it is easy to bend . . . easy to fish wires through . . . and economical due to greater corrosion resistance that means longer, trouble-free life in actual service. Youngstown Buckeye Conduit has also proven that it pays dividends through lower installation costs and greater efficiency. Add to these many features the fact that Youngstown Buckeye Conduit is manufactured "from iron ore to the finished product" by ONE integrated steel company and you know why it is prefered by so many.

CONDUIT

Size	Nominal Diameter (Inches) Internal	External	Nominal Wall Thickness (Inches)	Threads Per Inch	Feet Per Bundle
1/2	.622	.840	.109	14	100
3/4	.824	1.050	.113	14	50
1	1.049	1.315	.133	11 1/2	50
1 1/4	1.380	1.660	.140	11 1/2	30
1 1/2	1.610	1.900	.145	11 1/2	30
2	2.067	2.375	.154	11 1/2	
2 1/2	2.469	2.875	.203	8	
3	3.068	3.500	.216	8	
3 1/2	3.548	4.000	.226	8	
4	4.026	4.500	.237	8	
5	5.047	5.563	.258	8	
6	6.065	6.625	.280	8	

Conduit furnished in 10-foot lengths, threaded both ends with one coupling.

COUPLINGS

Size	Outside Diameter (Inches)	Length (Inches)	Pieces Per Carton
1/2	1.063	1.562	100
3/4	1.313	1.625	50
1	1.576	2.000	50
1 1/4	1.900	2.062	50
1 1/2	2.200	2.062	50
2	2.750	2.125	25
2 1/2	3.250	3.125	
3	4.000	3.250	
3 1/2	4.625	3.375	
4	5.000	3.500	
5	6.296	3.750	
6	7.390	4.000	

ELBOWS

Size	Radius (Inches)	Offset (Inches)	Pieces Per Carton
1/2	4.000	6.500	50
3/4	4.500	7.250	50
1	5.750	8.750	25
1 1/4	7.250	10.500	20
1 1/2	8.250	11.750	15
2	9.500	13.500	10
2 1/2	10.500	15.000	
3	13.000	18.000	
3 1/2	15.000	20.500	
4	16.000	22.000	
5	24.000	31.000	
6	30.000	37.500	

ELECTRICAL METALLIC TUBING

Size	Nominal Diameter (Inches) Internal	External	Nominal Wall Thickness (Inches)	Feet Per Bundle
1/2	.622	.706	.042	100
3/4	.824	.922	.049	100
1	1.049	1.163	.057	100
1 1/4	1.380	1.510	.065	50
1 1/2	1.610	1.740	.065	50
2	2.067	2.197	.065	30

EMT furnished in 10-foot lengths, without couplings.

THE YOUNGSTOWN SHEET AND TUBE COMPANY
GENERAL OFFICES • YOUNGSTOWN 1, OHIO • U. S. A.

BUCKEYE YOUNGSTOWN CONDUIT

HERE'S A

ra-heat and . . .

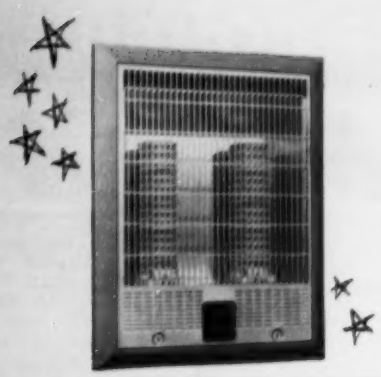
RAYWALL—Superior heaters for superior heat—Research and experience have proved that electric radiant heat is superior heat. Here at last is the superior electric radiant heater. Raywall Heaters combine all the wonderful qualities of electric radiant heat with special Raywall features that make the Raywall heating system the choice of thrift-wise home makers and home owners, contractors and builders—

The Raywall Heater is designed in a silver grey hammertone finish to blend with all room decors.

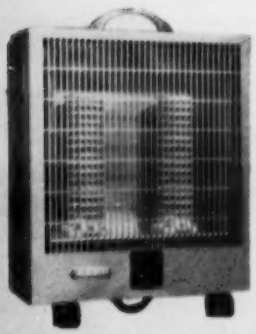
The grille is slotted for safety allowing a maximum of heat to pass through.

The parts are movable for cleaning.

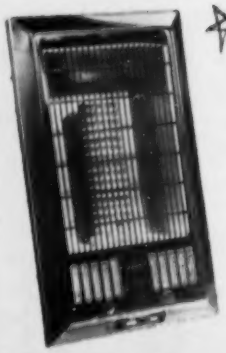
Raywall is also designed to take up less wall space, but they provide more heat.



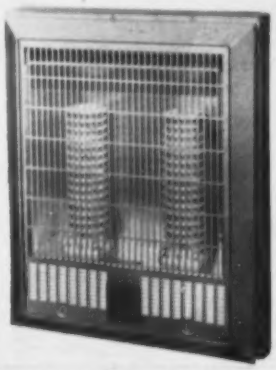
RAYWALL INSERT • Fits flush with wall, silver grey hammertone frame blends with all decorations.



RAYWALL PORTABLE • Heat, where you want it, when you need it. Fully automatic, feet heavy enough to keep from turning over, light enough to move from one room to another.



RAYWALL BATHROOM • Chrome finish heater for bath or kitchen, retains sparkle and brightness, easy to clean.



RAYWALL SURFACE MOUNTED • For any installation; concrete, cinder block, brick or wood. Fits snug against wall when attached with screws or toggle bolts.

REPRESENTATIVES:

TENNESSEE — Mr. C. E. Pitner, P. O. Box 693, Knoxville, Tenn.

GEORGIA — L. Morris Landers Co., 624 Spring Street, N.W., Atlanta, Ga., L. Morris Landers

NORTH & SOUTH CAROLINA — L. Morris Landers Co., 201 Worthington Street, Charlotte, N. C., Mr. W. L. Thurman, Jr.

ALABAMA & MISSISSIPPI — L. Morris Landers Co., 604 13th Street, S.W., Birmingham, Ala., Mr. C. E. Parker

FLORIDA — L. Morris Landers Co., P. O. Box 173, Riverview, Fla., Mr. W. I. Crichton

INDIANA — Electric Heat Distributors, Inc., 5700 Bluffton Road, Fort Wayne, Indiana

CALIFORNIA — Kenneth Anderson Co., 412 Seaton Street, Los Angeles, Calif.

WASHINGTON & OREGON — Ed B. Schack & Co., 2216 First Street, Seattle, Wash.

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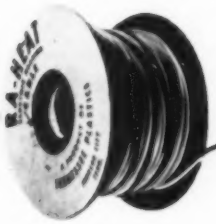
STAR-STUDDED LINE!

. . . raywall systems offer a full line for superior heating



ELECTRIC RADIANT HEATING SYSTEMS

From cable installation to thermostatic control Ra-Heat provides carefree service. The only thing visible is the small, trim, control which is complimentary to any wall.

Ra-Heat Cable is made from specially designed resistance wires insulated with a protective coating of plastic. Ra-Heat is stapled to the plasterboard and is then imbedded in plaster forming an invisible heating panel. Like the sun, Ra-Heat beams its warmth downward to objects below.

Ra-Heat Cable systems save space from the actual building of the home (you don't have to have a basement) to spacing the furniture in the rooms, this system allows four walls to place your furniture and appliances around.

Ra-Heat provides low installation costs, no upkeep. Ra-Heat is safe, no open flames or gases, no danger for children. Ra-Heat is clean, no air circulation to stir up dust. Ra-Heat is healthy, air stays moist and fresh, reduces colds. Ra-Heat is convenient, no fuel, no ashes, no breakdown.

WARRANTY AND GUARANTEE-Ra-Heat Cables and Raywall heaters have a factory backed guarantee to provide comfort and service for a period of five years.

RA-HEAT TEMPERATURE CONTROL- Degree range from 55° to 85°F. Approximately ½°F. differential. Rated at 2500W-120V or 5000W-240V, 22 amps. Just set it and forget it.

ra-heat & raywall

TENNESSEE PLASTICS, INC.
Johnson City, Tenn.

wall-mounted low or line voltage thermostat.

The new baseboard units have the same patented, cast-aluminum heating element which is used in all Electromode units. All electric wires

are insulated, embedded and completely sealed within this finned aluminum casting. There is no danger of fire, shock, or burn. In addition to its safety, this type element spreads heat quickly, resulting in greater efficiency and economy.

The basic unit is 32 inches long, 8⅛ inches high and three inches wide, with a capacity of 600 watts, and operates on 120 or 240 volts. Finished in silver grey hammertone, it presents a pleasing appearance just as it it. Or, if desired, the units may be painted to blend with room color scheme.

The complete Electromode electric heating line also includes bathroom heaters; wall heaters; portable heaters; thermostats; relay packages; radiant convection heating panels; radiant heating cable; available in 300 to 4600 watts for plastered ceilings, and 525 to 4000 watts for drywall ceilings, 120 and 240 volts; portable-suspension unit heaters, suspension type unit heaters, explosion-proof heaters, industrial heaters, milk house heaters, and a new pump house heater.

For additional data, circle item 804 *on the coupon on page* 50.

General Electric

GENERAL ELECTRIC CO., Bridgeport, Conn., has returned to the electric space heater field after a two-year absence.

Two newly-designed portable models have been introduced by the Automatic Blanket and Fan Department of the company's Small Appliance Division.

The automatic fan heater, Model H-1, 1320 watts a-c, with automatic thermostat is 10⅛ inches high, 9¾ inches wide, and 6⅛ inches deep, with a nine-foot cord set. This unit is portable and ideal for use in any room in the house. It weighs only 5¾ pounds, and the convenient carrying handle tucks out of sight when not in use.

The deluxe room heater, Model H-2, 1320 watts or 1650 watts, has a copper reflector and built-in fan. Features include an automatic thermostat, built-in indicator light, tilting base, and nine-foot cord set. It is 16½ inches high, 17¾ inches wide and 9½ inches deep. This unit heats two ways—comforting radiant heat, plus penetrating fan forced heat. It is also portable, weighing only 13 pounds, and also has the convenient tuck-away handle.

The General Electric heating line also includes radiant heating wire for use in all plaster ceilings and laminated gypsum wallboard ceilings. Each G-E radiant heating wire consists of a definite length of heating wire prefabricated with power leads. Each unit is made to specific wattage rating and voltage as stamped in the metal identification tags which are fastened to the non-heating power leads. The wires are also color coded for identification purposes. They are UL listed and are available in 240 volt units, 400 to 3800 watts, and 120 volt units, 200 to 1900 watts. The wire is available through the company's Wiring Device Dept., Providence 7, R. I.

For additional data, circle item 805 *on the coupon on page* 50.

Chromalox

A NEW SERIES of Chromalox electric baseboard heaters is now in full production at the Edwin L. Wiegand Co., 7500 Thomas Blvd., Pittsburgh 8, Pa. These new electric heaters are

designed for heating entire homes by electricity, for supplemental heating in hard-to-heat rooms, and for auxiliary heating of playrooms, sun porches, etc. UL approved, the new product is prefabricated in attractive heavy-gauge steel units of five, two, and one foot lengths.

Three new portable automatic space heaters have also been added to the Chromalox line of electric heating equipment. The new models have built-in thermostatic controls to maintain room temperatures at the comfort level, and are heat-powered with fully insulated, metal-sheathed tubular elements. All a-c, Chromalox space heaters are available in models 120 and 240 volts, 1320 to 4800 watts.

Rounding out the Chromalox line are blower-type portable unit heaters; blower-type floor, wall and ceiling mounted unit heaters; forced air heaters for large areas; radiant and convection comfort heaters; thermostats and contactors; and Thermwire cable and tape for a variety of applications.

For additional data, circle item 806 *on the coupon on page* 50.

Ceilheat

A NEW LINE of space heaters has been added to the electric radiant heating products manufactured by Ceilheat, Inc., of Knoxville, Tenn. These new wall-unit space heaters include specially compounded ceramic cones which support the nichrome heating coils. The cones are delta shaped rather than round, which the manufacturer reports reduces the entrapment of heat.

Another special feature of Ceilheat wall-type space heaters is the aluminum grille which is sufficiently open to permit the passage of heat and at the same time closely spaced to prevent fingers or any other objects from reaching the heating coils. Lip-slot louvers conceal the thermostat housing and interior wiring while providing free exposure of the thermostat bulb to room temperature air. This feature induces a flow of room temperature air over the thermostat bulb giving more accurate temperature control.

The new Ceilheat wall heaters are produced in 11 models rated at from 1000 to 4000 watts capacity. All frames are finished in gray hammertone, guaranteed not to flake or discolor, and with an aluminum grille. Single cone models are available with chrome grille and frame for bathroom use.

The electric radiant heating cable line of Ceilheat, Inc., includes the Aristocrat cables for plastered ceilings, which range from 306 to 2990 watts. The 120-volt cables cover a range of from 306 watts to 1495 watts, while the 240-volt cables cover the range of 612 watts to 2990 watts.

The Ajax line of cables is especially designed for concrete floor installation. This line is available in wattages ranging from 350 to 4400 watts.

The Dri-Ceil line of heating cables is especially designed for dry-wall

James W. Potter, Potter Electric Service, Urbana, Illinois

"Naturally, I'm figuring on Day-Brite —I've found it pays"

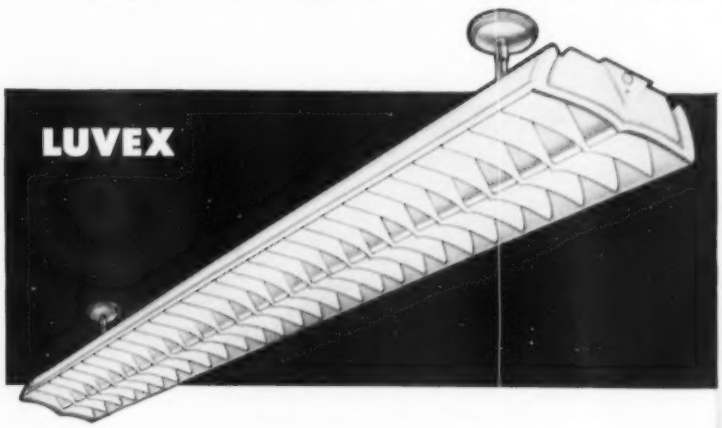
"I'll tell you why I am so strong for Day-Brite fixtures:

"In the first place, Day-Brite makes an out-and-out quality product. All the time. And that counts for a lot, because when I install Day-Brite fixtures I can count on customers who are completely satisfied. That leads to more business for me—you know, nothing beats a satisfied customer.

"On the job, Day-Brite fixtures are a cinch to install. Because they're so easy to hang and line up, I save a lot of time. And, as the old saying goes—'Time is money.'

"Another thing: Day-Brite deliveries are OK. The fixtures arrive in good shape—they're complete with all fittings and fasteners. Shipping cartons are coated on the inside with a special wax film to protect the fixture finish against abrasion and damage. I can always be sure of a 'factory-fresh' fixture.

"There are a lot of other things about Day-Brite fixtures that make them preferred, not only by contractors, but by architects and owners, too. Ask your Day-Brite representative to tell you more."



Attention to detail makes Day-Brite Fixtures "decidedly better." For instance, note the overall rigidity of LUVEX® fixtures. They maintain alignment even in areas near shop work where vibration is present.

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NATION'S LARGEST MANUFACTURER OF COMMERCIAL AND INDUSTRIAL LIGHTING EQUIPMENT

type construction. These cables are available for 240-volts only in wattage ratings extending from 500 to 4000.

Ceilheat, Inc., also offers two lines of Ceilheat panels. The Gypsum line, especially recommended for residential heating, consists of 240-volt units in three sizes: three by four feet, 240 watts; four by five feet, 400 watts; and four by eight feet, 640 watts.

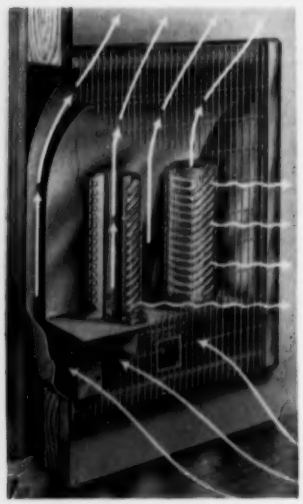
The Asbestos line of Ceilheat panels, recommended for office and commercial heating, are available in the same three physical dimensions as the Gypsum line, but each dimension has three different wattages available, the full line covering a range of from 300 watts to 1120 watts. All panels are rated 240 volts.

For additional data, circle item 807 *on the coupon on page* 50.

Wesix

A VERY COMPLETE line of electric heating equipment is available from the Wesix Electric Heater Co., 390 First St., San Francisco, Calif.

Wesix-Ionix wall furnaces (illustrated) employ electric chimney action that assures warm air circulation at about 200 feet per minute.



Featuring the new Wesix combined bi-metal thermostat and two-pole lockout switch, the units provide accurate temperature control plus safe, sure switching which disconnects both sides of line—both operated from a convenient one knob control.

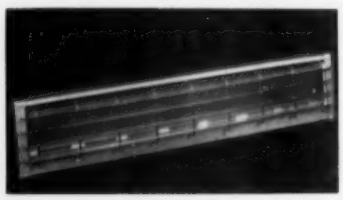
In addition to the Wesix-Ionix wall furnaces, the line includes standard wall furnaces; baseboard panels in two-feet eight-inch and four foot sections; bathroom heaters in a large variety of shapes and sizes; a complete line of portable electric space heaters; a new look in modern electric heating — the unique space heater called the Wesix Fire Ball; bracket type heaters; wall fan type heaters; floor furnaces; Centramatic control packages; ceiling heat cable, which is available in 120 volts at wattages ranging from 300 to 1500 — 240 volts, 600 to 3000 watts, color coded; air thermostats; and load regulators.

For additional data, circle item 808 *on the coupon on page* 50.

Berko

AS A RESULT of the expanding interest in perimeter house heating, Berko Electric Manufacturing Corp., 212-40 Jamaica Ave., Queens Village, N. Y., has brought on the market a baseboard unit which is designed to take full advantage of electric glass heating.

The new Berko baseboard heating line is designed for heating a whole house or a room, as required. It can



also be used for supplementary heating of a "hard to heat" room. A thermostat in each room ensures exact regulation of temperature.

To meet the growing need for increasing output from electric heating sources, Berko has also announced the development of a new 1500-watt radiant glass panel. The new high-output units are built for three voltage ranges: 120, 208 and 240 volts.

The Berko line includes a number of other applications of their glass radiant heating panels — specially designed units for heating rooms with large window areas, units for small rooms such as bathrooms, laundry and dressing rooms, and an attractive glass portable heater, which is rated at 1250 watts and operates on 115 volts.

For additional data, circle item 809 *on the coupon on page* 50.

Cavalier

A NEW super-efficient electric baseboard, with a surface temperature that stays below 125 degrees F, is being marketed by Cavalier Corp., 343 W. First St., Chattanooga 2, Tenn. The unit performs an additional service in homes with large picture windows or glass wall areas, since it prevents moisture clouding.

Cavalier electric baseboard is available in two lengths — 32 and 48 inches — so any multiple of 16 inches can be obtained. Height is

six inches, thickness 2 1/16 inches, 160 watts per foot. Special corner pieces are available and heating sections are finished off with special end caps which join standard wooden baseboard.

To speed installation, there are two knockouts to each section (one in back and one in bottom) and a continuous wire raceway through all sections and through corner pieces.

Several sizes of portable electric heaters are featured in the Cavalier electric heating line, which also includes a complete selection of wall insert heaters, surface mounted heaters, electric floor furnaces, and bathroom heaters.

For additional data, circle item 810 *on the coupon on page* 50.

G-E Weathertron

GENERAL ELECTRIC'S Weathertron Dept., Bloomfield, N. J., has announced a completely new line of packaged air-source heat pumps. The new models feature a more compact size and greatly improved performance due to a more effective relationship between heating and cooling capacity. Key factor in the improved heating-cooling ratio is a unique modulated hermetic motor-compressor, designed specifically for heat pumps.

To capitalize on the fact that heat pumps operate with safety and cleanliness because they burn no fuel, G-E's appearance engineers have customized the new Weathertrons, providing them with panels that can be papered or painted to go with any room decor. They can be built into the wall if desired.

Because the new models are more compact and all maintenance and service is done from the front, total

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Anderson-McGriff Company, Atlanta, Georgia

Everyone on our staff enjoys selling Moe Light fixtures, now that we have a Moe Light Home Lighting Center. Everything needed to do a competent sales job, is right on the spot—attractively displayed—plainly identified and clearly priced. What's more, Moe Light's beautiful catalog is filled with authoritative information—helps our salespeople in offering helpful and decorative suggestions that lead to extra sales.

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Moe Light is a nationally advertised, complete line, with fixtures for every room, every taste, every budget. Moe light offers you a choice of ceiling, wall or counter displays, each with a sales-tested assortment of fast-moving fixtures that show immediate profit.

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space requirements in some cases are as little as ¼ as much as needed for the old models. Actual floor space occupied by the new models is 9.8 square feet.

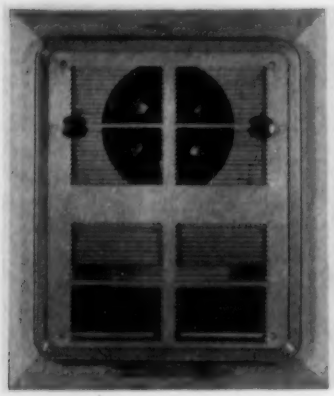
Generally speaking, the 44C models will heat and cool a six to eight room standard house while the 66C models will condition a seven to nine room deluxe house.

For additional data, circle item 811 *on the coupon below.*

Markel-LaSalle

A NEW LINE of heavy-duty wall-insert and wall-attachable automatic fan-forced Heetaires with 2000 to 5000 wattages has been put on the market by Markel Electric Products, Inc., and LaSalle Products, Inc., 145 Seneca St., Buffalo 3, N. Y.

These new heavy-duty automatic Heetaires (Series H270-GT) are designed on the modern shadow box principle and engineered on the approved perimeter heating principle.



In addition to the ease of installing in new or old walls, these heavy-duty automatic fan-forced Heetaires have a special access door through which the main connection to the feeder line can be inspected and serviced without removing the Heetaire from the wall.

Markel is also offering to the trade this year a revolutionary new ceiling radiant heater. It is available in 1000 or 1250 watts.

In their electric space heater line, Markel is offering a total of 13 models of Fan-Glo Heetaire and Thriftee Heetaire portable electric heaters.

In addition to guaranteeing every Heetaire for one year to be free from defective materials and workmanship, Markel has announced that the 1955-56 line of Fan-Glo Heetaires, all six models, will feature a lifetime guarantee on the two patented Neo-Glo elements in each of these models.

For additional data, circle item 812 *on the coupon below.*

Superior

A FAN HEATER, designated as No. 600, is now being marketed by Superior Electric Products Corp., Cape Girardeau, Mo.

The model is equipped with a 1320-watt Nichrome element and heavy duty motor. The motor is rubber mounted for quiet operation and the unit is portable. The carrying handle is of bakelite and a heavy duty Neoprene cord is attached.

The Superior Fan Heater weighs six pounds and measures 10 inches by 11½ by 7, and it is suitable for a-c voltage only.

Another featured model of the Superior line is a reflector bowl heater.

For additional data, circle item 813 *on the coupon below.*

Broan

IMPORTANT IMPROVEMENTS that add automatic heat control to their fan-type electric heaters for bathrooms, nurseries and recreation rooms are announced by the Broan Manufacturing Co., Inc., 1669 N. Water St., Milwaukee, Wis. Current models are equipped with the latest bulb-type thermostatic control which now provides automatic temperature control from 60 degrees to 90 degrees F.

Broan electric heaters are built into the wall and give assurance of an instantaneous flow of cozy, even heat from floor to ceiling. A fan, behind the electric heating element, draws in cold air at the bottom and forces a stream of heated air out through the top of the grille. It is ideal also for drying hair, freshly washed lingerie, or baby clothes.

Two electric heaters comprise the Broan Line—Model U-15 (1500 W, 5000 Btu/hr) with nickel-plated Uniflow grille, and Model S-12 (1200 W, 4000 Btu/hr) with stainless steel grille. Both come with toggle-switch or Thermostatic control.

For additional data, circle item 814 *on the coupon below.*

ELECTRICAL SOUTH
806 Peachtree St., N.E.
Atlanta 5, Ga.

August, 1955

RE: ELECTRIC SPACE HEATING PRODUCTS

Gentlemen:

Please send me the bulletins and catalogs on products indicated.

(Print Plainly)

Name_____ Title_____

Company_____

Address_____

City & State_____

Circle numbers below. Bulletins, catalogs, or new product information will be mailed promptly.

801	802	803	804	805
806	807	808	809	810
811	812	813	814	815
816	817	818	819	820
821	822	823	824	825
826	827	828	829	830
831	832	833	834	835

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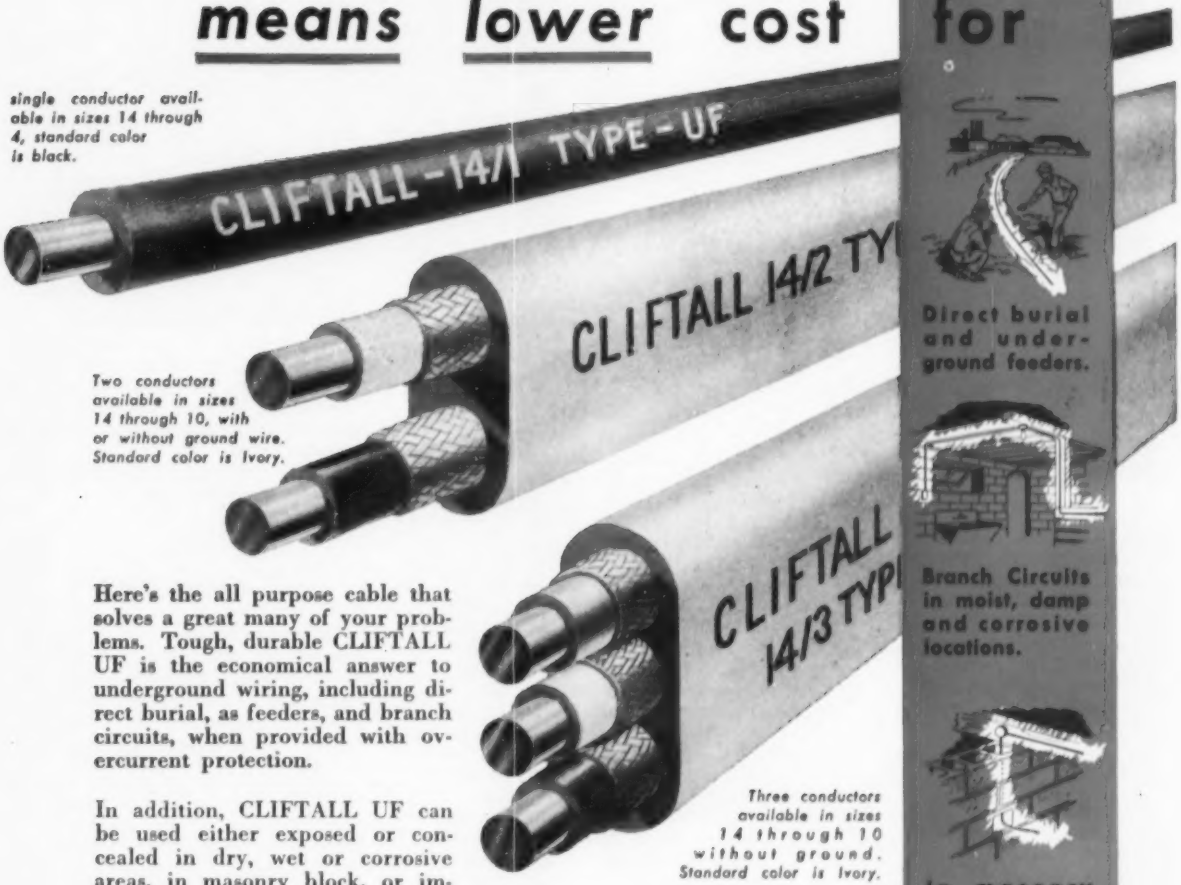
FOR MORE INFORMATION — Use this handy return coupon for requesting manufacturers bulletins or additional information on new products listed in these pages. Be sure to give firm name and your position or title.

NEW CLIFTALL UF CABLE

means lower cost for



single conductor available in sizes 14 through 4, standard color is black.

Two conductors available in sizes 14 through 10, with or without ground wire. Standard color is Ivory.

Three conductors available in sizes 14 through 10 without ground. Standard color is Ivory.

Here's the all purpose cable that solves a great many of your problems. Tough, durable CLIFTALL UF is the economical answer to underground wiring, including direct burial, as feeders, and branch circuits, when provided with overcurrent protection.

In addition, CLIFTALL UF can be used either exposed or concealed in dry, wet or corrosive areas, in masonry block, or imbedded in plaster.

Direct burial and underground feeders.

Branch Circuits in moist, damp and corrosive locations.

In masonry blocks or wall tiles

In CLIFTALL UF, bare copper conductors are insulated with high quality thermoplastic, color coded for convenience, then covered with reinforced fiber glass. The parallel conductors are then sealed as a unit in high quality thermoplastic that can withstand the most rugged conditions.

Approved by Underwriters Laboratories, Inc., and recognized by National Electric Code (1953). CLIFTALL UF is available in sizes 14 to 4 AWG, single conductor only; 14 through 10 in two conductor with and without ground, and 14 through 10 in 3 conductor without ground. Use CLIFTALL UF and be sure!

Also recognized for use as TYPE NMC (non-metallic sheated cable, corrosive resistant.) Section 3362, a and b.

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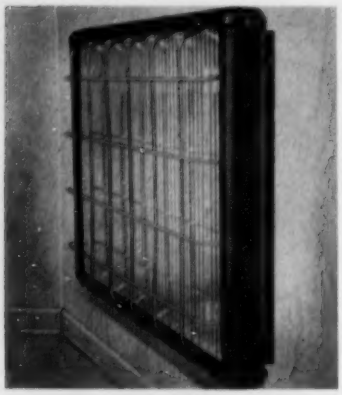
WIRE—CABLE—RIGID CONDUIT—ELECTRIC METALLIC TUBING—CLIFTALL UF

Infraglass

INFRAGLASS Heater Co., Inc., 350 S. Sanford St., Pontiac, Mich., is now making available a line of portable glass electric heating units, wall panels and baseboard units.

Especially popular in the Infraglass line is Model D-3 and D-3T, a standard portable heater of 1000



watt, 115 volt capacity. The unit measures 24 by 24½ inches, and weighs 20 pounds. Model D-3T is equipped with thermostat. It is available in black only and is styled along very modern lines.

For additional data, circle item 815 *on the coupon on page* 50.

Knapp-Monarch

FEATURED in the line of electric space heaters offered by Knapp-Monarch Co., 3501 Bent Ave., St. Louis 16, Mo., is the No. 16-512 Fin Radiation Heater, which will heat an entire room (8x12x15 feet). Dur-A-Life heating elements in this K-M unit provide radiating surface 35 times greater than standard rod elements. The 528 fins attain a heat of 900 degrees F. The unit operates on 115 volts, a-c only.

Other heaters in the Knapp-Monarch line are the No. 16-505 Air Fan Heater, the No. 16-508 Fin Radiation Heater, and the No. 16-501 Tropic-Glo Heater. All units in the K-M line are thermostatically controlled, with the exception of the Tropic-Glo model. Prices on the line range from $9.95 to $49.95.

For additional data, circle item 816 *on the coupon on page* 50.

Meier

A HOME-HEATING CABLE that is stapled onto ceiling lath and then completely covered with plaster has been introduced by Meier Electric & Machine Co., Inc., 3525 E. Washington St., Indianapolis 7, Ind.

Capable of being installed in a whole house in a day, the system, called Meier Radiant Cable, obviates the necessity of a space-consuming central heating plant. The only visable part of the Radiant Cable system, once installation is completed, is a small thermostat in each room.

Cable 3/64th of an inch in diameter is stapled with a hand stapler in a uniform pattern over ceiling construction before plaster is applied. Power supply and the radiant cables are connected to the thermostat and that completes the installation.

The system has been approved by Underwriters' Laboratories for either plaster or dry wall construction.

For additional data, circle item 817 *on the coupon on page* 50.

Arvin

NINE PORTABLE MODELS, eight of them newly designed and engineered and six of these with automatic control, comprise the 1955-56 electric room heater line introduced by Arvin Industries, Inc., Columbus, Ind.

Top heater in the new line is Model 5534. This fully automatic heater turns on when room temperature falls below the thermostat setting and shuts off automatically when dial setting and room temperature are balanced. Finished in copper-tone enamel with chrome grill and chrome accents, this heater operates at 1320 or 1650 watts and moves 81 cubic feet of warm air per minute. Heat is both fan-forced and radiant from new-type "air-flow" elements that speed up air circulation and show twice as much radiance as before. A "Safeguard" safety switch cuts off the current instantly if the heater is upset and a signal light glows when the heater is on.

All Arvin heaters operate on 110/120 volts, 60 cycle, a-c. They are guaranteed for one year and are listed by Underwriters' Laboratories, Inc. The 1320-watt heaters develop 4500 Btu, the 1650-watt models, 5600 Btu.

For additional data, circle item 818 *on the coupon on page* 50.

Berns Air King

TWO THERMOSTAT controlled electric heaters, Model FH14, 1320 watts, and Model FH15, 1650 watts, are now being offered by Berns Manufacturing Corp., 3050 N. Rockwell St., Chicago 18, Ill., in addition to their Tropi-Cool Heater Fan, Model FH9 (illustrated), 1650/1320 watts, which has a Nichrome heating element.

The Tropi-Cool model has a one knob control for both degrees of heat and for cooling. All three models come in smart Beigetone baked on enamel with wrought iron finished handle and stand. Chrome guards in front and back insure safety—yet permit full air delivery for maximum efficiency. All units are for 110 volt a-c operation.

Berns is also offering their Jet-Ray heater in two models—FH10, 950/1500 watts, and FH12, 1320/850 watts. Both models are designed so that they expel the hot air that is trapped in the heater when the element is turned off. This permits the thermostat to "read" the actual room temperature, not the heater temperature, for faster, more accurate response to room air changes.

These two models use Ferrod heating elements to deliver heat that can be felt in just 20 seconds and a pressure blower blade to provide greater air delivery and quiet operation. All heaters in the Berns line are UL approved.

For additional data, circle item 819 *on the coupon on page* 50.

Circle-Air

FEATURED in the line of heating equipment being made available by Circle-Air Industries, Inc., 244 Herkimer St., Brooklyn 16, N. Y., is a completely self-contained convection electric baseboard unit.

The Circle-Air unit occupies little space and will go where regular units cannot be installed. It is available in three models, all 10 inches high, three inches deep. Lengths are 28, 36, and 48 inches, and all three models can be recessed to lie flush with the baseboard or can be installed standing free from the wall. All three are available with efficient built-in single pole thermostats.

Circle-Air baseboard units employ a "fin" type heating element which carries a five-year guarantee backed by a leading insurance company. Air is warmed completely and evenly and circulates through the room by natural convection principles. Wattages for three models are 700, 1050, and 1400. All models are available in 115 and 230 volts.

The Circle-Air line also includes a portable convection electric heater thermostatically controlled with pilot light to save electricity and prevent wasted heat. The heating element is guaranteed for five years, and the unit is finished in baked enamel.

Other items in the line include several standard model space heaters.

For additional data, circle item 820 *on the coupon on page* 50.

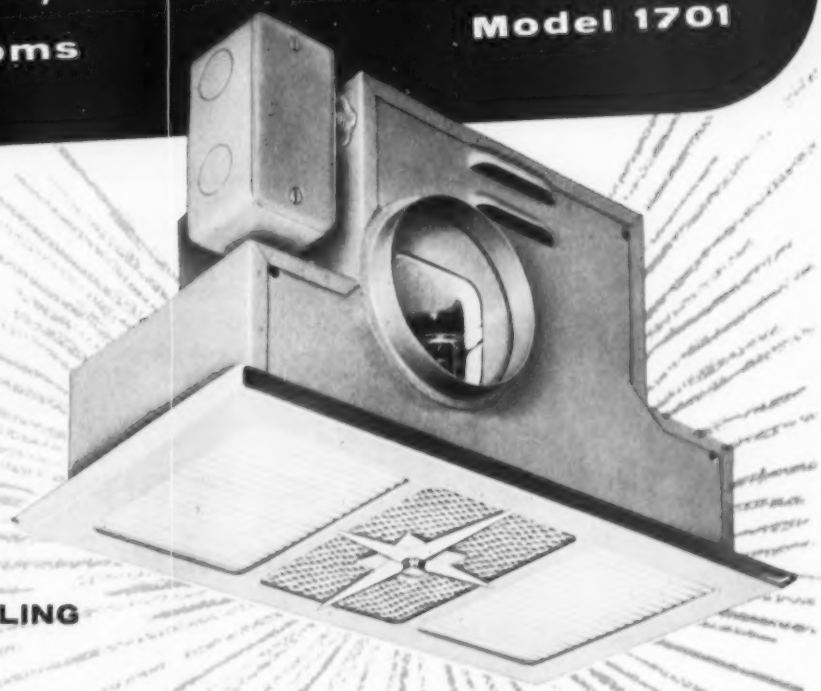
Revolutionary... New...

TRADE-WIND

VENTILATOR/LIGHT COMBINATION UNIT

for Bathrooms

Model 1701



HANDSOME CHROME AND GLASS DESIGN...

MOUNTS FLUSH IN CEILING

OFFERS UNUSUAL APPEAL TO HOME BUYERS

Another outstanding *first* from Trade-Wind! A combination bathroom ventilator and illuminator beautifully designed in a flush-type ceiling unit. Two 75-watt bulbs provide brilliant illumination. And the time-tested Trade-Wind 100 CFM blower unit assures complete ventilation—for both inside and outside baths—eliminating steam, lingering dampness and odors.

Easiest to Install...

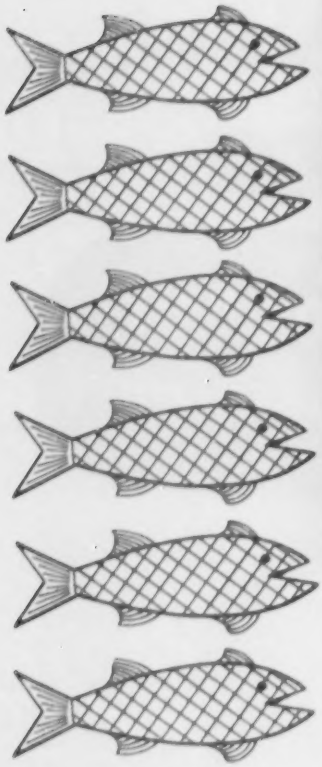
Trade-Wind Model 1701 *installs between joists* and the single installation gives you both light and ventilation, thus cutting installation expense. *The unit is pre-wired*, further eliminating extra work in running asbestos leads. It can be wired to a single switch or 3 wires run to a double switch. The Trade-Wind Time-Delay Switch also can be used.

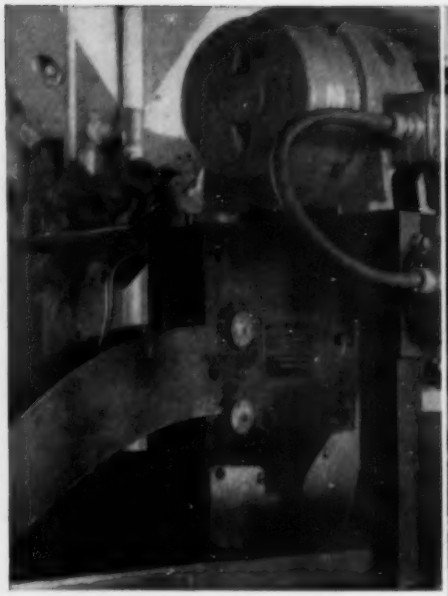
The PRICE will surprise you!

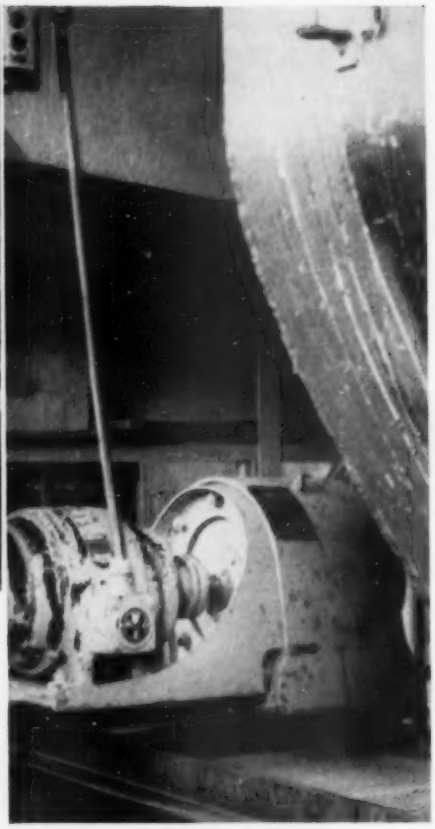
Trade-Wind has priced the Model 1701 at a rock bottom figure, making this new light/ventilator combination an outstanding "buy" for every type of home.

Trade-Wind Motorfans, Inc.

7755 Paramount Boulevard, Department ES, Rivera, California







Motors on automatic fish processing line at a Washington cannery, showing flexible leads of tough, water- and oil-resisting TIREX SO Cords that work in a shower of fish cleanings and steam.

TIREX CORDS solve problem of keeping motors running in fish cannery...

Automatic fish processing machines at a Washington cannery take fresh fish at one end of a long table, remove entrails, fins, tails, heads and scales, and deposit meat ready for canning at the other end.

The machines are driven by small motors that work in water and gurry, and that have to be hosed down with live steam.

Water kept getting into the motors and causing them to fail.

The cannery's chief electrician covered the motor cables with three different types of flexible conduits.

None of them kept the motors dry.

He solved his problem this way:

He used TIREX SO Cords with watertight fittings for the motor leads.

Now no water gets into the motors.

TIREX again proved its ability to stand up and "take it", even under constant attack from water, heat and oil.

Have you a problem TIREX might solve? If you have, write to the address below.

Simplex-TIREX SO Cords

SIMPLEX WIRE & CABLE CO.
79 Sidney Street, Cambridge 39, Massachusetts

Electresteem

PORTABLE, plug-in electric steam radiators, light enough to be carried from room to room are available from the Electric Steam Radiator Corp., Paris, Ky. These lightweight all-steel radiators, called Electresteem, provide safe steam heat from any wall plug.

Electresteem radiators, available in either eight or 10-section models, heat by a combination of convection and radiation and distribute abundant, uniform steam heat to every corner of the room. Models are available in either Walnut or Ivory finish.

When used with a portable plug-in Electresteem Deluxe Thermostat, the radiator provides perfect automatic heating. Electresteem radiators operate for about two cents per hour in most areas of the country and will run for about 200 heating hours without refilling. No draining is required when stored in freezing temperature.

For additional data, circle item 821 *on the coupon on page* 50.

Tropic-Heat

TROPIC-HEAT radiant heat cables, manufactured by Pan American Electronics Co., 2605 Louisiana Ave., Beaumont, Texas, are available in both 120 and 240 volt ratings, and in wattages ranging from 300 watts to 3000 watts. The 120-volt cables are available in units ranging from 300 to 1500 watts, a total of eight different wattages being available. The 240-volt cables range from 600 watts to 3000 watts.

The heating cables are all equipped with eight-foot long lead wires of No. 14 TW building wire. A vapor-tight splice between the heating cable and non-heating lead wire assures no trouble at this point. All cables are marked with an identification marker showing the name of the manufacturer, location of the plant, manufacturers catalog number, watts, voltage, and length of cable.

For additional data, circle item 822 *on the coupon on page* 50.

Sunwarm

THE ELECTRIC radiant heating cables manufactured by Sunwarm, Inc., Kingsport, Tenn., are available in two types: the "S" series for regular plaster ceiling installation, and the "SD" Series for dry-wall laminated installation.

The plaster ceiling cables are available in three different voltage ratings, 120, 208, and 240 volts. Eight wattages are available in each voltage rating, their respective limits being: 300-1500 watts, 520 to 2592 watts, and 600 to 3000 watts.

The dry-wall type cables are available at 208 volts and 240 volts. Eight different wattages are available in each voltage, the 208-volt units ranging from 310 watts to 2320 watts, while the 240-volt units range from 358 watts to 2684 watts.

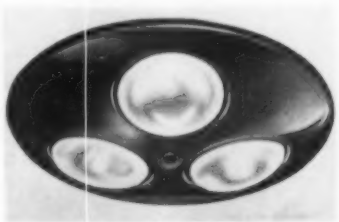
Also available from Sunwarm, Inc., is a line voltage radiant heating thermostat covering a range of 55 degrees to 85 degrees F. The thermostat operates at a differential of ½ degree F. The manufacturer also has available stapling machines and staples for fastening radiant heating cables to the ceiling.

For additional data, circle item 823 *on the coupon on page* 50.

Pryne

PRYNE AND CO., 142 N. Towne Ave., Pomona, Calif., has announced a new ceiling heater. This unit employs radiation from heat rays from ceiling to floor, instantly, at the flick of a switch.

There is no waiting for elements to warm up or hot air to circulate, the infra-red rays give deep, penetrating heat. The new Pyrne unit is recommended for bathrooms, especially where wall space is limited. Easy to install, this ceiling heater is a recessed fixture installed between ceiling joists. It is pre-wired to a built-in box, and does not require a special circuit.



Available in one-lamp and three-lamp units with either chrome or painted finish, the ceiling heater has no reflector to polish, is quiet, has no fan or motor to service, is UL approved, and is easily cleaned by merely wiping the surface. Cost of operation is nominal, only 750 watt for the three-lamp unit.

Because it is installed in the ceiling, children cannot reach it, making it extremely safe, even for bathroom use. It accommodates R-40 infra-red lamps available at any electrical store.

For additional data, circle item 824 *on the coupon on page* 50.

Thermador

THE NEW low wattage wall heat fan recently announced by Thermador Electrical Manufacturing Co., Los Angeles 22, Calif., is a sturdy, compact, safe unit which is easily and quickly installed and economical to use.

Separate switches for fan and heat are located near the top of the heater for more convenient operation and a neon indicator light glows when the heater is working. This unit is ideal for small rooms such as dressing rooms, nurseries, dinettes, dens, etc.

The Thermador wall heat fan has a louvre grill which forces the flow of warmed air downward to warm a room from the floor up, with less heat waste at the ceiling level. Resistance coils are Nichrome wire and fan action induces constant air flow over coils, preventing oxidation and deterioration through red glow and maintaining even "black heat."

The quiet, heavy-duty motor is a single-phase induction type and the four-blade fan is dynamically balanced. Thermostatically controlled heaters offer the same features as manually controlled, plus a built-in 25 amp thermostat. Finishes offer choice of bronze, white enamel or stainless steel.

For additional data, circle item 825 *on the coupon on page* 50.

Uskon Panels

SPECIALLY PROCESSED panels, called Uskon, which utilize a sheet of electrically conductive rubber within the panel as the heating element, have been developed by the Uskon Dept., Mechanical Goods Div., U. S. Rubber Co., Rockefeller Center, New York 20, N. Y.

Uskon heating units are available in two forms, namely in sheets 1 1/16-inch thick, Type T, or in rigid panels ¼-inch thick, Type B. Both types use a large sheet of rubber which conducts electricity as the heating element. The rubber element is completely sealed within the panel and provides completely uniform heat. There are no electrical wires within the panel. Uskon Panels are approved by Underwriters' Laboratories, Inc.

Uskon Panels operate on 230 volts. They may also be obtained for operation on 115 volts. The panels are made with an output of 22 watts per square foot (75 Btu per square foot). In large installations the 230 operating voltage reduces installation costs by reducing wire sizes, reducing electrical circuits required, reducing the size of control equip-

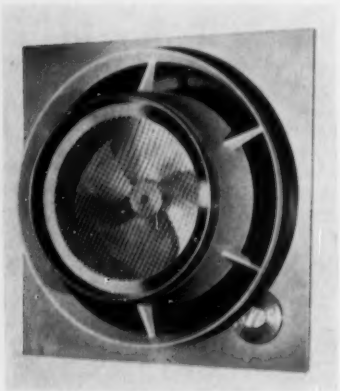
ment and reducing the overload protection required. The 115-volt panels are particularly adaptable for small installations, individual rooms and specialty heating.

For additional data, circle item 826 on the coupon on page 50.

Nesco

THE NEW Nesco line of "Aireryte" heaters and room conditioners includes several radiant electric heaters, and all are designed with latest modern styling.

The electric heaters in the line are highlighted by Model 541 which is equipped with automatic comfort-ryte dial and built-in thermostat. The model also operates as a two-speed fan and air circulator when the element is turned off. It is completely portable and adjustable to circulate in any direction. Model 541 is covered with a wire mesh grille to make it completely safe. It, like other models in the line, may be attached to a wall or other stationary place, or may be used on the floor.

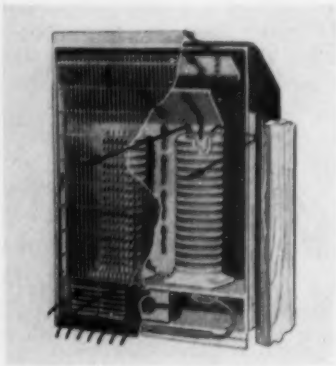


The Nesco line manufactured by Nesco, P. O. Box 2043, Milwaukee 1, Wis., contains several variations of the Model 541, in smaller and larger sizes, and Model 544 (illustrated) designed specifically for wall installation.

For additional data, circle item 827 on the coupon on page 50.

Everwarm

EVERWARM, INC., formerly Electric Heating Products, Inc., 2925 N. Central Ave., Knoxville, Tenn., has announced the addition of a complete line of radiant-convection electric wall insert heaters. The units feature a basically new cone design under the name of "Guide-Ray" that permits the heat normally trapped behind the cones to be reflected out into the room.



Ranging from 1000 to 4000 watt capacity, Everwarm wall insert heaters are being produced in eight models of popular one, two, and three-unit styles. All are available in smart grey hammertone finish Single-cone models are offered also in chrome for bathroom use. A highly-efficient aluminized steel reflector is also high on the list of Everwarm features.

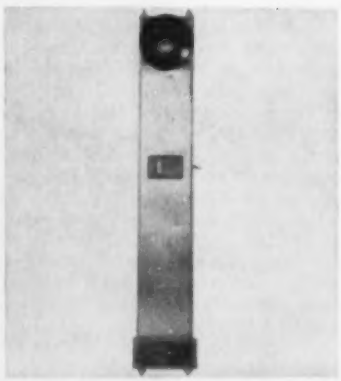
The Everwarm electric heating line also includes radiant electric heating cables.

For additional data, circle item 828 on the coupon on page 50.

Electrend

THE LINE of electric home heating equipment manufactured by Electrend Products Corp., St. Joseph, Mich., operates on a new principle employing a metal duct approximately seven feet high, eight inches wide and 3½ inches deep. In the duct, there are two openings covered by grilles, one each at the top and bottom, and just inside the upper grille, a fan unit is mounted.

This fan draws out the layer of warmed air ordinarily present just under the ceiling and sends it down over a heating element just above the lower grille. There the necessary extra heat is added, and the warmed air flows out of the lower grille across the floor for warming the floor of the room in which the installation is made. The system is completely automatic.



One or more of the ducts are mounted between the studding of the walls in each room, and one of the principal advantages of the idea is that installation takes up no floor space. The ducts are particularly suitable for smaller homes, cabins, motels, and basementless buildings.

For additional data, circle item 829 on the coupon on page 50.

Frank Adam

A BUILT-IN TYPE electric heater, called the Quikheter, is being manufactured by the Frank Adam Electric Co., 3650 Windsor Place, St. Louis 13, Mo. The unit is available in two models, with built-in control switch or with built-in thermostat. It is scientifically designed and constructed for electric heating by air circulation.

The Frank Adam heaters feature a beautiful chromium finish front. Matt, polished or oxidized copper, brass or bronze finish are available at additional cost.

The unit's genuine Nichrome wire heating element should never wear out under normal operating conditions. The unit has a polished metal reflector of high lustre, stain-resistant steel.

Air space behind the reflector and on both sides prevents overheating of wall and provides additional air circulation. The enclosing box is made of heavy 16 gauge galvanized steel. Automatic tension adjustment maintains even tightness of the heating element.

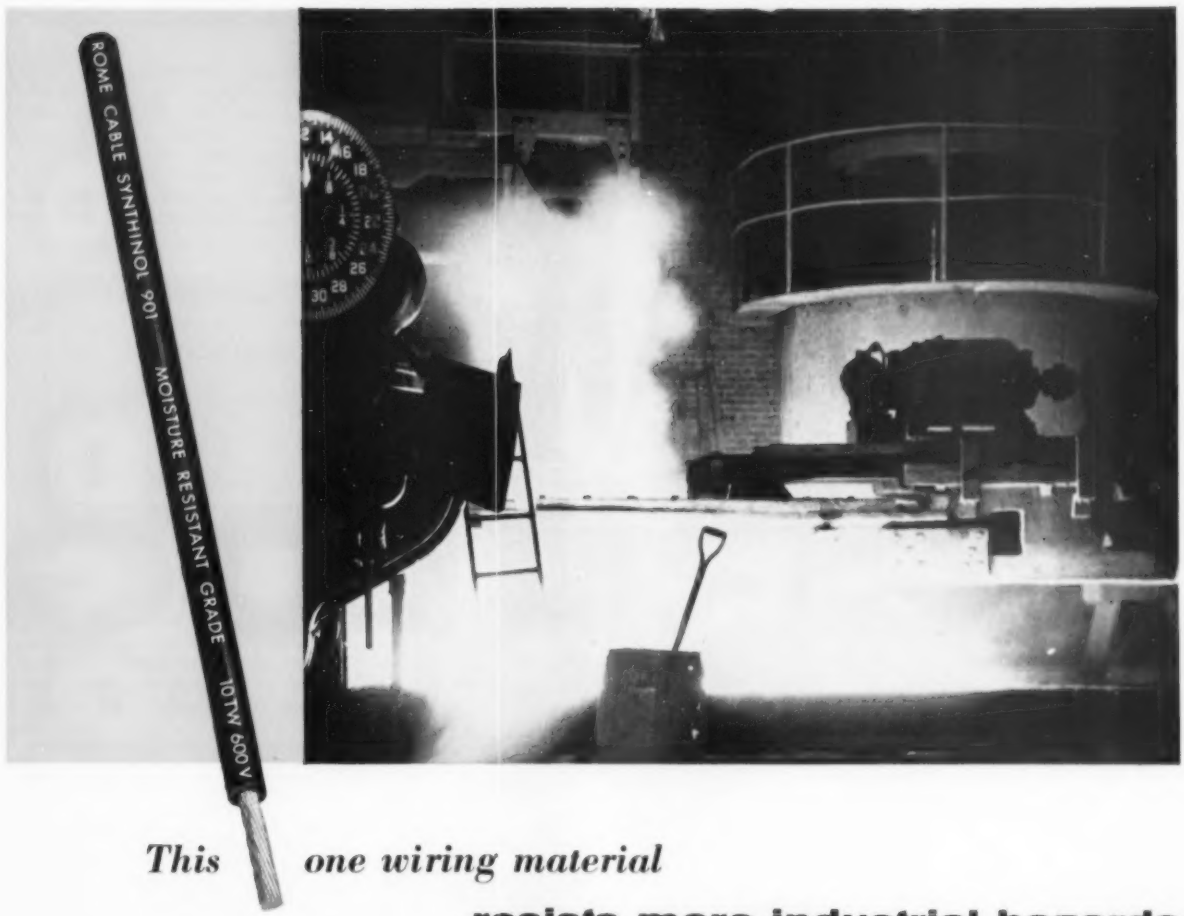
Quikheter units are available in wattages from 1000 to 3000, 120 and 240 volts, with or without thermostat.

For additional data, circle item 830 on the coupon on page 50.

Heatmore

THE LINE of radiant ceramic heaters being manufactured by Heatmore, Inc., 59 Throop Ave., Brooklyn 6, N. Y., employs the principle of completely imbedding nichrome wire inside a special one-piece ceramic panel.

The thickness of Heatmore's new ceramic heating panels has been increased to ⅝ inches. This provides



This one wiring material

resists more industrial hazards

than any other

You get these important approvals with this multi-purpose wire:

- U/L approval as Type TW for 60° C. under the National Electrical Code
- Conforms to standards of National Machine Tool Builders Association for machine tool wire
- U/L approval as appliance lead wire for 600 volts at 90° C. through size 4/0 AWG and for 105° C. on sizes No. 24 through No. 8 AWG

. . . a single versatile thermoplastic construction, Rome Synthinol® 901.

For the really tough jobs in industry . . .

If your wiring must withstand the deteriorating effects of cutting oils and solvents, acids or other chemicals, greases, moisture, steam, corrosive fumes, abrasion, flame, it will pay you to use Rome Synthinol 901. It's made for the "hot spots" in industry—chemical plants, refineries, paper mills, and the like.

These outstanding characteristics have been proved time and again *in actual use*. They're not claims based only on laboratory tests.

Refineries are typical . . .

In refineries, at the bulk loading stations, Rome Synthinol 901 has been continuously exposed to the damaging effects of *heat and oil*. Its inherent resistance to both enables Synthinol 901 to take this punishment indefinitely.

In chemical plants . . .

One source of explosion hazard in chemical plants is hydrocarbon oils. Where these are processed, Rome Synthinol 901 offers valuable protection because of its exceptional oil resistance.

A manufacturer of transformers uses Rome Synthinol 901 as original equipment, for coil leads. It does not contaminate the transformer oil, even though it's immersed in the oil over extended periods at continuous operating temperatures of 90° C. (or higher).

Unequaled performance . . .

For 600-volt service under extreme conditions of heat, moisture, corrosive fumes, oil or chemical corrosion, or combinations of all these, Rome Synthinol 901 outperforms comparable wiring material—rubber and polychloroprene compounds, and many of the other commonly used thermoplastics now on the market.

In this one wiring material, plant electrical engineers, industrial contractors, or original equipment manufacturers can get characteristics unequalled in any other wire.

Strong claims? You can prove them for yourself by testing Rome Synthinol 901 in your own plant or laboratory. It's made for conditions that are death to ordinary electrical wiring.

It Costs Less to Buy the Best

ROME CABLE ROME, N.Y.

ROME CABLE *Corporation*

ROME · NEW YORK *and* TORRANCE · CALIFORNIA

"...no parts to lose"

"--and 5 sizes handle anything!"

SCRULUG

Type KPA

Know your Burndy SCRULUGS:
Five sizes will handle all cable, from #14 solid through 500 Mcm; tinned for corrosion resistance ... Here's the best of the low cost terminals.

BURNDY

55-9

Norwalk, Connect. • Toronto, Canada • Factories: New York, California, Toronto • Export: Philips Export Company

greater heat retention; longer, more uniform infra-red radiation; and greater strength to an already rugged heating panel.

In addition, a new method of termination has been designed to assure life-long positive contact and trouble-free operation. It consists of

pressure joining the element wire to a nickel-plated steel insert prior to molding so that the entire assembly is embedded inside the ceramic panel with one end of the female-threaded insert flush with the surface.

Smokeless, asbestos covered lead wires, crimped to lugs, are factory fastened to the insert by nickel-plated terminal screws.

The Heatmore line includes Series A portable models; Series PK deluxe wall mounted panels; and Series LS radiant ceramic baseboard panels.

For additional data, circle item 831 *on the coupon on page* 50.

Continental

A FOOTNOTE to heating comfort is a new space saving, electrically operated, radiant Glassheat baseboard

panel, recently introduced by the Continental Radiant Glass Heating Corp., 1 East 35th St., New York 16, N. Y.

The panels are constructed of specially tempered glass fused with aluminum strips. The infra-red rays are projected by means of a metal reflector behind the glass. This type of heat is completely safe and even at the maximum temperature of 300 degrees F, no blistering or searing results from direct contact.

These "Foootlighter" units may be mounted end to end in continuous fashion across the room and are ideal for use under picture windows. They are zone controlled by thermostats. Frame size is nine inches high by 47⅛ inches long. The glass size is six inches by 45 inches.

The panel has a 750 watt capacity, 245 volts, a-c and d-c current. It comes in neutral hammertone grey finish and may be painted to blend with any decor. The "Footlighter" bears the Good Housekeeping Seal and is UL approved.

Other units in the Continental line include a new radiant glass portable heater, called the Infra-lectric, and various sizes of glass panel units for a variety of uses.

For additional data, circle item 832 *on the coupon on page* 50.

Can Arm

THE LINE of electric heaters being marketed by Can Arm Corp., P. O. Box 30, Chazy, N. Y., includes several models of permanent wall panels and portable and baseboard convection heaters, and portable and permanent glass heaters.

Two of the portable models are of the radiator type, one waterless and the other an automatic water model designed to humidify as well as heat. The electric water model is equipped with thermostat, which is optional equipment on the waterless model. Both are built with heavy duty sealed elements. The water model is available for 115 or 230 volts, rated 1500 watts, and the waterless model is available for 118 or 230 volts, 1000 watts without thermostat and 1500 watts with thermostat.

For additional data, circle item 833 *on the coupon on page* 50.

Dominion

A HEATER that has both fan forced and radiant electric heating highlights the space heater line offered this year by Dominion Electric Corp., 150 Elm St., Mansfield, Ohio. This unit, Dominion's Model 1530 Automatic Heater, has a furnace type thermostat which automatically controls room temperature at Low-Medium-High dial setting.

A signal light glows only when the current is on. Should the heater be tipped over, the current is instantly cut off. The Model 1530 has a chrome plated safety guard, and the unit has a beautiful, baked enamel finish. It also has a conveniently arranged carrying handle, and it gives no radio or TV interference.

Elements in the 1530 are enclosed,

rod type for longer life. Maximum load of the unit is 1650 watts. It gives 5,600 Btu's on 110-120 volt a-c, only.

The Dominion line also features the Model 1528 "Heat-R-Fan," which is a double duty unit—heater and fan. It can be adjusted for directional control from 10 degrees below horizontal to vertical, and will cool 500 feet of air per minute, or heat 200 feet of air per minute.

For additional data, circle item 834 *on the coupon on page* 50.

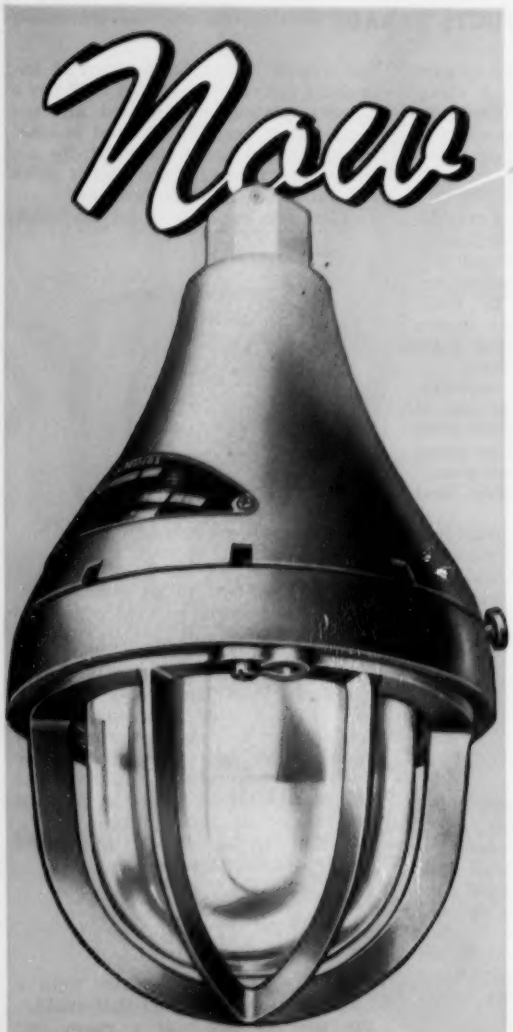
Titan

AN ELECTRIC space heater with a built-in automatic timer that enables the user to pre-heat a room and keeps it at desired temperature has been introduced by the Titan Corp., 110 Seneca Warehouse, Buffalo 10, N. Y. The new heater, called the Chron-o-Matic, features an automatic timer dial which enables preselection of the hour the heater will go on to pre-heat a room to comfortable warmth before entering. Once on, Titan's Therm-O-Dial control unit can be switched on to keep room at desired temperature as long as needed.

The Chron-o-Matic heater includes such additional features as Titan Ever Cool case; forced convection heat, and tip-over switch which turns the heater off if it is knocked over while in use.

The new unit is UL listed, completely portable, and is finished in hammered baked enamel with aluminum trim. It has rubber cushion shock mountings. Specifications are as follows: Model 322—1320 watts, 110-120 volts, 60 cycle a-c. Model 326—1650 watts, 110-120 volts, 60 cycle a-c.

For additional data, circle item 835 *on the coupon on page* 50.



NO AIR PRESSURE NEEDED! Type EVA *contains* the explosion rather than preventing it: no "pumping up" required. Re-lamp right in hazardous areas: just switch off circuit, unscrew globe holder and replace lamp. No pressure switch to fail and create possibilities for hazard. Low initial cost and simple maintenance will mean sustained performance at top economy with these new Crouse-Hinds lighting fixtures.

200 W: with or without guard or reflector; overall length, 13⅜".

Complete, explosion-proof lighting installations for acetylene & hydrogen areas!

CROUSE-HINDS CONDULETS®

UL Approved for Groups A and B Locations

- **The first complete lighting system designed and UL-approved for Class 1, Groups A & B, as well as C & D hazardous locations.**
- **New lighting fixture can be re-lamped even in the presence of combustible gases: gas-tightness not required for its safe performance.**
- **Heavy, shock-resistant construction withstands pressures from internal explosions without rupturing.**
- **Flame-tight joints prevent escape of flame to flammable atmosphere.**

Whether you're installing a complete explosion-proof lighting system – or merely converting a few of your Group C or D fixtures to these safer Group A's – Crouse-Hinds provides greatest safety and economy. See your Crouse-Hinds distributor, or write us.

Explosion-proof Tumbler Switch Condulets

Explosion-proof Junction Condulets

Explosion-proof Sealing Condulets

Explosion-proof Flexible Couplings

Explosion-proof Condulet Unions

A NATIONWIDE DISTRIBUTION exclusively through ELECTRICAL DISTRIBUTORS

CROUSE-HINDS COMPANY

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OFFICES: Birmingham, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Denver, Detroit, Houston, Indianapolis, Kansas City, Los Angeles, Memphis, Milwaukee, New Orleans, New York, Philadelphia, Pittsburgh, Portland, Ore., St. Louis, St. Paul, San Francisco, Seattle, Tulsa, Washington. RESIDENT REPRESENTATIVES: Albany, Atlanta, Baltimore, Baton Rouge, Charleston, Chattanooga, Corpus Christi, Reading, Pa., Richmond, Va., Shreveport. Crouse-Hinds Company of Canada, Ltd., Toronto, Ont.

CONDULETS • FLOODLIGHTS • TRAFFIC SIGNALS • AIRPORT LIGHTING

The Magazine

for

Southern

Electrical Men

Is

ELECTRICAL SOUTH

✦

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of our
READER SERVICE

The editorial and business staff of **Electrical South** is eager to serve you. One way in which we can help you is to make it easy for you to draw upon the wealth of technical and promotional material available from manufacturers.

In the accompanying pages are the descriptions of scores of useful catalogs, application information booklets, and technical publications. These are available without charge.

Check over the list of publications available, circle the numbers of the ones you need, and mail the coupon to us with your name, title, company and address plainly written. We will tell each manufacturer to send directly to you the information you want.

HUBBELL
REG. U.S. PAT. OFF.

PRESSURE PLATE

BACK WIRING

FOR GREATER WIRING SECURITY, SAFETY AND CONVENIENCE

Diagram at right shows how the Hubbell pressure plate mechanism is designed. The stripped wire, when inserted through the reinforced back wiring holes (left), locates between the two terminal plates which, as the screw is tightened, pressure-grip the wire securely (picture below).

the convenience of modern back wiring *plus* the **safety** of a pressure plate screw connection

Save-A-Splice . . .

Another important advantage of Hubbell pressure plate back wiring is the fact that a circuit may be extended using both back and side wiring. The same binding screw anchors both the wire inserted through the hole in back and the side-looped wire.

Twist-Lock
No. 7582

Highest Grade
HEAVY DUTY
WIRING HUBBELL **DEVICES**

23HH55A

HARVEY HUBBELL, INC. DEPT. R-2 BRIDGEPORT, CONN.

FACTORY WAREHOUSE LOCATIONS ASSURE NATIONWIDE STOCK AVAILABILITY

State and Bostwick Sts. Bridgeport 2, Conn. | 37 South Sangamon St. Chicago 7, Ill. | 103 North Santa Fe Ave. Los Angeles 13, Calif. | 542 Natoma St. San Francisco, Calif. | 1111 Dragon St. Dallas 7, Texas

Follow these easy steps to get EXTRA CONSTRUCTION SAVINGS AND LONGER CONDUCTOR LIFE with fine FANNER ARMOR RODS superformed

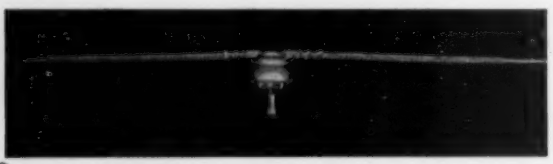
1 Select the proper rod size and number of rods in a set for size of conductor to be armored.

2 Hold one or two rods with centers close to conductor at the support point and rotate rods, keeping fingers held close to installed portion. (About one pitch away—not further).

3 With a rotary wiping motion of the hands install these rods for a distance of about 2 pitches each side of center.

4 In like manner install successively the remaining number of rods for the "set".

5 When all rods are installed for the initial distance, rotate entire group with rotary wrist action and continue until the ends snap into place.



6 The final installation of Superformed Armor Rods will appear smooth and uniform (no clips or clamps are ever needed).

Fine FANNER Superformed ARMOR RODS are applied easily and quickly . . . provide positive, lasting protection for overhead conductors. These precision-formed, rugged wires of special spring type metals, when applied as shown in the illustrations, minimize chances of rod distortion, assure proper rod distribution around conductor, and eliminate crowding of last rod in set. An enlarged reprint of these 6 steps to real construction savings is available to you for the asking. Ask our agents or write for copy now!

Fine Fanner Superformed

Licensed for use under Patent No. 2,275,019

THE FANNER MANUFACTURING CO.
Brookside Park • Established 1894 • Cleveland 9, Ohio
AGENTS IN PRINCIPAL CITIES

Portable power

(*Continued from page* 19)

The trailer also mounts two cradles for bottles—one each of oxygen and acetylene for cutting and welding.

Hand mobility

When on the job a third wheel can be lowered from the frame directly behind the coupling. This wheel is adjustable for height by means of a pin and spaced holes in both members of the shaft. With the wheel lowered into contact with the ground, the trailer can be moved, fully loaded, if on level ground, by two men.

When semi-permanently placed on a job the trailer is further steadied by a leg at the rear. This, too, is adjustable for height.

Wheels and tires on the trailer are interchangeable with those used on company pick-up trucks. Thus, in event of a flat on the road, delay is measured only by the task of substituting the truck's spare wheel and tire.

Heating costs

(*Continued from page* 30)

required for lighting and other appliances. He figures his average heating cost to be about $15 per month. This house is served by the Alabama Power Co., whose rate averages about 1½ cents per kilowatthour on electric heat.

It is estimated that in the Montgomery area, about 850 kilowatthours per 1,000-watt panel per year will be required at a cost of about $12.75 per 1,000-watt panel per heating season. This represents a total yearly heating bill of $127.50 in a ten-panel house, the average size installation. As far north as the Birmingham area, consumption averages about 1,000 kilowatthours per 1,000-watt panel per year, or a cost of $150 per heating season for a ten-panel house.

In the South Alabama and North Florida climate, the average seasonal rate drops down to 700 to 750 kilowatthours per 1,000-watt panel per heating season, or a total cost of $95 to $105 for the same size house. Such a house would probably use at least one less 1,000-watt panel in this southern area.

These average costs are calculated on a 1½ cent rate and would be proportionately higher if the rate averaged higher.

ALLIS-CHALMERS

DISTRIBUTION TRANSFORMERS

Get These 6 Features

1 High Voltage Sidewall Bushing Has Safety-Designed hand-knob which can't be unintentionally removed, positively prevents touching "hot" parts. No more splicing: connector grips *two* standard conductors as large as No. 2 stranded cable at same time. Conductor can't slip or twist. Use either copper or aluminum wire.

2 Low Voltage Bushing Has Double Key Design to provide positive protection against rotation, eliminate a cause of internal short circuit and maintain effectiveness of seal. Use either copper or aluminum wire. Corprene gaskets are fully retained, are compressed without twist or shear.

3 Tank Bottom Is Recessed with Straight Wall inside and out — there is no place for water to collect. Cover and tank have horizontal gasket surface to assure proper gasket compression with no possibility of shear. Cover clamps are captive, will not drop to ground when loosened. All tanks pressure-tested at 50 psi.

4 Coils Are Locked Firmly with adjustable coil supports. Pad under support distributes pressure evenly. Pad is of specially compounded alkyd polyester impregnated glass fiber for extra strength.

5 Improved Surface Protection because hot spray paint method puts paint, not solvent, on transformers. You get even flow of high content, specially developed alkyd resin enamel that provides a smooth surface with high gloss and thorough coverage.

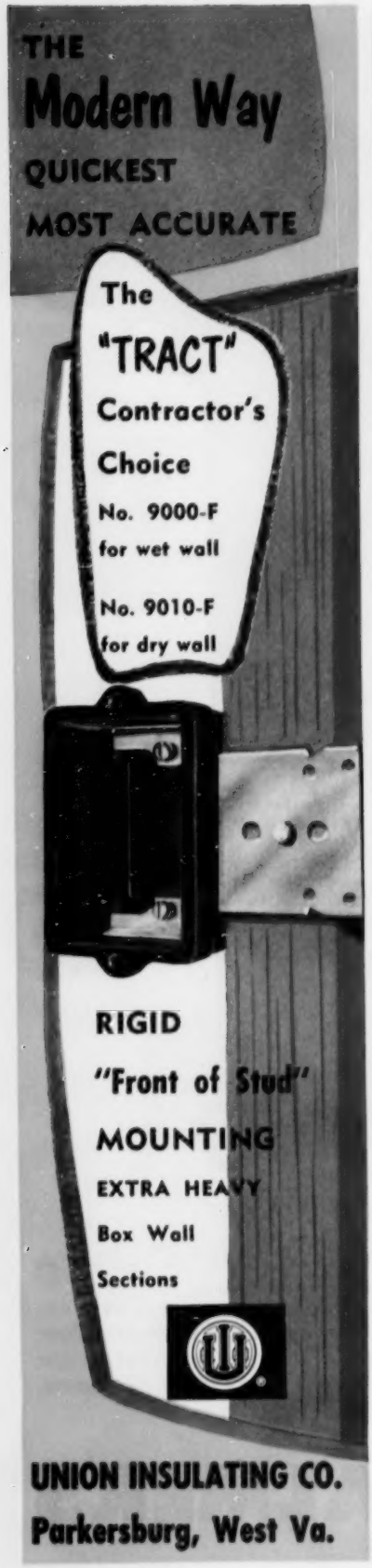
6 Shipping Crate Provides Pallet as Bonus. After transformer is removed from crate, the pallet bottom can be used for other materials.

A-4778

See these advantages for yourself in Allis-Chalmers Visualizer kit. Your nearby A-C office representative can show it to you. Or write Allis-Chalmers, Milwaukee 1, Wisconsin.

A-C ALLIS-CHALMERS

ALLIS-CHALMERS



How to advertise

(*Continued from page* 21)

shotgun. You waste nothing on the general public; but advertise only to those people who are likely prospects for electric heat.

Handling direct mail

It's a beautiful theory, but how do you get this magic list of prospects? How big should it be, and how do you know when you have the right names? The answers to these questions depend on your own ingenuity, common sense, and the amount of time you can afford to spend in maintaining lists. Especially the time question. Most small businessmen had better stay away from direct mail entirely, simply because they have no one available to spend the necessary time.

On the other hand there is frequently one person in the office, who has to stay there anyhow, and who has limited amounts of time during the month to tackle odd jobs. In my opinion, the man who has his wife in business with him is likely to be the direct mail advertiser. She knows the business, knows people, and will take pains with every detail. She can put down a couple of hundred good names from her knowledge of the community, and further additions can come from a study of the newspaper, with particular attention to weddings, promotions, new arrivals in town, new subdivisions and new extensions of electric service.

The layout of your town or city is often the key to successful direct mail advertising. Certain areas will have the people of the right age and income level to be your best prospects. You can concentrate on the growing parts of the community and forget the unproductive areas. Above all, depend on your own knowledge of your market, and make certain that either you or some interested partner in your business can devote plenty of time to your lists, not only in the beginning, but every month.

Direct mail message

What about the subject matter of direct mail advertising? We could get into an endless discussion if we tried to cover the whole field. I would like to suggest only one approach to the problem. I believe that the personal note is the thing—a letter from you to your customer, in your own words, will do more good than all the advertising copy in the world.

With the letter you can enclose manufacturers descriptive material. That shortens your letter, because you only have to tell about your service. Perhaps you will enclose information on two different systems of electric heating, which is all to the good, but don't enclose *three*, because you will confuse the customer. Always give the buyer a *choice*, but never too many choices, or you will never get a decision.

Summarizing, advertising should be an extension of your own personal selling. The money you spend should be moderate, geared to the size of your business. You must spend it steadily over a period of months and even years to get the full benefit. Much of it you can handle yourself. Naturally you won't attempt to lay out an actual newspaper ad, and you may want to get help on the wording of your radio spots, but in general you must put your message into your own words and see that it reaches those people who are potential customers.

Circulating systems

(*Continued from page* 39)

ance of an offset. In some house designs, it is possible to find suitable wall locations which can be reached from inside closets so that room walls do not have to be redecorated after installing the units in an existing house. In some installations, the bathroom unit has been mounted on the inside of a line closet door and connected by means of a flexible cable.

The manufacturer points out that because the already warm air near the ceiling is drawn off by the fan and reheated for distribution at floor level, the range of temperature between the floor and the ceiling is less than that experienced with conventional type warm air systems. Also, because of the low storage capacity of the heating elements, the heating effect of the unit is felt almost immediately after being turned on and this permits the thermostat to maintain close control of temperature.

The internal connections are such that the fan in the unit can be operated without the heating elements being turned on, thus providing a built-in fan for air circulation during warm months.

TO INCREASE YOUR HEATING BUSINESS

BERKO

PRESENTS

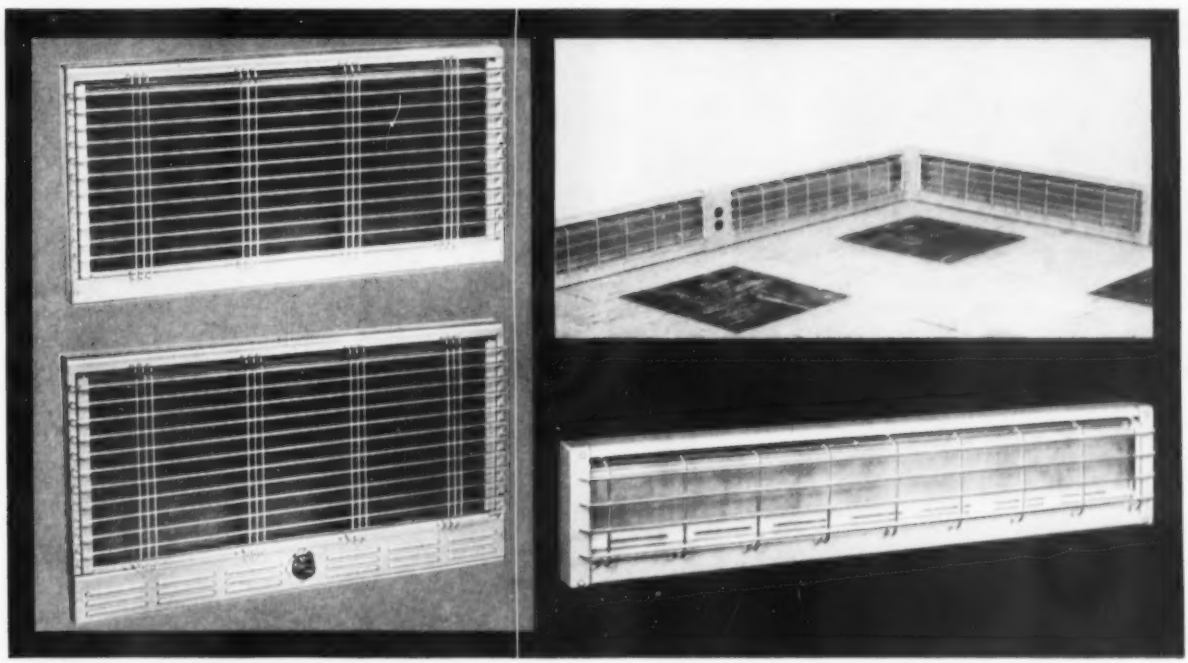
Two important new radiant heat panels

Model THC & HC 1500-watt panels . . . Model BB Baseboard panels

THE PRODUCTS OF EXTENSIVE RESEARCH AND DEVELOPMENT . . . these new models represent Radiant Electric Heating at its best. They embody all the top-quality construction and design features that have established BERKO as the industry's leader.

INTRODUCED FOR THE FALL HEATER BUYING SEASON, these fine BERKO products give you something *different* and *better* to sell. They are backed by an outstanding promotion program which "pre-sells" both full home and supplemental jobs.

WHENEVER YOU SELL BERKO HEAT, your efforts are protected by a rigid distributor-dealer policy which ensures a fair profit for all concerned. No wonder BERKO is the line that is preferred by the trade as well as the consumer! Feature BERKO for profit.



FOR ANY BIG HOME HEATING JOB . . . Model THC (with thermostat), or Model HC (without Thermostat). Can be ordered for 120, 208 or 240 Volt service.

FOR THE ULTIMATE IN PERIMETER room heating . . . new BERKO Baseboard Panel (Model BB240) is easy to install, provides for duplex outlets.

Find out how to profit from more heating business. For free literature, write to Dept. ES-8
BERKO Electric Mfg. Corp., 212-40 Jamaica Ave., Queens Village 28, N. Y.

BERKO **GLASS ELECTRIC RADIANT HEATING**

Maintenance engineers' notebook

Maintaining industrial wire and cable systems

◆ ANY COMPREHENSIVE PLAN for the maintenance of industrial electrical equipment should not fail to include the maintenance of the electric wiring system. Too often the electric circuits themselves, because of their lack of moving parts, etc., are given little consideration in the regular maintenance program. Experience proves, however, that a regular schedule of inspection and maintenance for the wiring system itself will uncover many minor difficulties which otherwise might deteriorate until they become major faults and causes of outages.

An essential tool for wiring maintenance is a carefully drawn up plan of the electrical wiring. This may take the form of a series of drawings or one master drawing, but regardless of its form, it should be complete and accurate. Such a wiring plan will often prevent wiring troubles by giving the industrial engineer needed information as to circuit loadings and so on. When new load is to be added, the circuits may be studied to determine where the load can best be connected to the system, rather than just connecting it to the nearest circuit without knowledge of what existing loads or maximum capacity of the circuit may be.

For smaller plants, a master drawing showing all circuits will be found most useful because the complete system can be studied without difficulty. For larger plants with several buildings, a good plan is to make up a small scale drawing showing the relative location of buildings and loads, and showing on this drawing the electrical feeders serving them, with details as to wire sizes, etc.

For each individual building, prepare a detailed floor plan and indicate all essential electrical equipment, including all power and lighting feeders, subfeeders, distribution panels, with such additional information as conduit sizes, type and size of conductors, and if space on the drawing permits show all branch circuits for power and lighting, location of motors and other load devices.

Such a record of the wiring system will have only limited usefulness unless it is corrected from time to time as changes are made. All changes, however minor, should be recorded at the time the change is made in order that the plan will always be up to date.

Equipment schedules useful

In making up such a plan, a numbering system should be used to designate feeders, branch circuits, and various pieces of equipment in order that they may be readily identified. This is especially important in the case of larger systems where system drawings will be supplemented with schedules of equipment such as switchboard and feeder schedule, motor and control schedule, etc. These numbers should be stenciled or tagged on the equipment physically.

The schedules of equipment mentioned here are an important part of the distribution system records because it enables the maintenance engineer to get an over-all picture of load on certain feeders and such similar information related specifically to the distribution system. (Such schedules of equipment have only essential details listed and do not in any way substitute for individual equipment record cards necessary for maintenance history of individual pieces of equipment.) A schedule of equipment such as motors, for example, would include such electrical data as horsepower, phases, voltage, speed, and type, with such other data as name of machine driven, location, type of controller, etc. Such schedules should provide extra columns for writing in special information such as load test data. This can be inserted in pencil lightly with the date of the load test. When later tests are made, the old data can be erased and newer information inserted.

If the wiring system of an industrial plant has not been subjected to regular inspections, it will be advantageous to make a general system survey to determine the condition of all wiring and related equipment. Such a survey should include test data as well as visual inspection. The principal tests to be made are loads tests, voltage tests, power factor tests, and insulation tests. These data in themselves will provide a good picture of the condition of the electric distribution system.

In addition, the surveyor should watch especially for conditions that may lead to electrical wiring troubles. For example, some makeshift or temporary wiring may be found that should be put into permanent form. Dampness and moisture conditions may have developed in areas where they were not anticipated and where wire and cable types are not suited to damp or wet locations. In other instances, corrosive or explosive atmospheres may have developed in areas not wired properly for such hazards. Operating and ambient temperature conditions may have changed and may be exceeding values for which conductor insulation was designed. In certain areas, mechanical injury hazards may have developed and will necessitate remedial action. Ground connections and bond wires may have been removed or may have deteriorated.

Check vibration often

Such a general survey of wiring should be made at intervals of six months or a year. However, any portion of the wiring system that is subject to vibration should be inspected monthly. In such instances, all mechanical connections such as locknuts or bushings should be tightened. Examine bond wires and ground connections, and examine all wiring in switch boxes, motor connections, etc., for possible mechanical injury. In locations that are particularly dusty, switch and panel boxes should be cleaned out frequently. Make certain that all covers fit tightly and are in place.

Protect your Customer..

AS WELL AS YOUR EQUIPMENT

with low-cost, dependable

KEARNEY

TRIP-O-LINK FUSE CUTOUTS

These simple and practical fuse cutouts are economical to install and easy to service. The Trip-O-Link fuse link combines the fuse and cartridge in a single, replaceable unit. Inside the fibrelined cartridge the arc is extinguished less than a cycle after interruption. When the fuse blows, the spring tension holding the fuse is released, speeding arc interruption.

The easy-to-catch contacts exert 30-40 lbs. grip on the fuse cable, but the vertical pressure exerted by spring tension is only 3½ lbs. You get high-pressure contacts without excessive strain on the fuse element.

281

For Better Construction···Safer Maintenance

JAMES R. KEARNEY

The Mark of Quality

Specify **KEARNEY PRODUCTS**

JAMES R. KEARNEY CORPORATION • 4224-42 CLAYTON AVENUE, ST. LOUIS 10, MISSOURI • Canadian Plant: GUELPH, ONTARIO

Keep all unused knockout holes plugged tightly.

One of the tests referred to above to be made periodically is the insulation resistance test. This should include cable insulation and motor insulation.

Insulation resistance tests will frequently disclose trouble spots through abnormally low readings. But the value of such tests, made with a megohm meter, is greatest when they are made regularly and the readings are compared with previous test results so as to show changes in insulation resistance.

Because the resistance of insulation varies considerably with temperatures, comparisons should be made only between test results made at approximately the same temperature. For example, an insulation test made on a motor just after it has been shut down may vary considerably from a test made on it after standing idle for several hours. This variation in insulation resistance has no particular significance insofar as the condition of the motor is concerned. But if the insulation resistance measured with the motor windings at approximately room temperature of 75 degrees F. showed a marked decrease from a previous test made under the same temperature conditions, then the change in insulation resistance would indicate a definite deterioration of the insulation.

Checking insulation

Some generalization can be made as to what insulation resistance readings are acceptable evidence that insulation is in good condition. An association of motor rebuilders recommends the following as minimum insulation resistance for rewound electric motors: 240 volt motor, 0.2 megohms; 440 volt motor, 0.4 megohms; and 550 volt motor, 0.5 megohms.

The insulation resistance of interior wiring is covered by the National Electrical Code, Section 1119, which reads:

"All wiring shall be so installed that when completed the system will be free from short-circuits and from grounds other than as provided in Article 250. In order that a reasonable factor of safety may be provided the following table of insulation resistances is suggested as a guide where the insulation is subjected to test:

"1. For circuits of No. 14 or No. 12 wire, 1,000,000 ohms.

"For circuits of No. 10 or larger conductor, a resistance based upon the allowable current-carrying capacity of conductors as fixed in Tables 1 and 2 of Chapter 10 of this code, as follows:

25-50 amp, incl., 250,000 ohms
51-100 amp., incl., 100,000 ohms
101-200 amp, incl., 50,000 ohms
201-400 amp, incl., 25,000 ohms
401-800 amp, incl., 12,000 ohms
Over 800 amp, 5,000 ohms

"2. The above values shall be determined with all switchboards, panelboards, fuseholders, switches and over current devices in place.

"3. If lampholders, receptacles, fixtures, or appliances are also connected, the minimum resistance permitted for branch circuits supplying same shall be one-half the value specified in paragraph 1.

"4. Where climatic conditions are such that the wiring or equipment is exposed to excessive humidity, it may be necessary to modify the foregoing provisions."

When air circuit breakers overheat

When air circuit breakers are first installed, conditions are generally satisfactory and the breakers operate properly. As time goes on troubles develop and one of these is overheating.

A frequent cause of overheating is an increase in surrounding temperature. Additional equipment may have been installed in the room where the breakers are located, and the ambient temperature may be higher than when the breakers were originally installed. The best remedy is to arrange some means of circulating cooler air.

Overheating of air circuit breakers may have its cause in the breaker contacts themselves. The contacts may not be meeting properly, they may be badly pitted or burned, or they may be covered with dirt and grease.

A simple check on how the contacts are meeting can be obtained with a piece of tissue paper and a thin sheet of carbon paper. The carbon paper is laid with the carbon face against the tissue paper, and the two are inserted into the space between the breaker contacts. The circuit breaker is then closed upon the sheets, and the tissue paper is examined afterward to see what kind of impression was made upon the tissue paper. The contact is generally considered satisfactory if the contact bar leaves a mark on the paper equal to at least 75% of the width of the contact. If the contact between bars does not appear to be sufficient they should be adjusted so that better closure will result.

The remedy of course for dirty contacts is to remove the accumulated dirt and grease, and if the contacts are burned and pitted, they should be dressed with a file and fitted properly, taking care that the same general shape of the contacts is maintained.

Overheating of air circuit breakers will sometimes be the result of continuous or prolonged overloads. Loads added after the breaker was installed or changes in the load characteristics of the circuit served may account for such overloads. The remedy is to replace the breaker with one of proper capacity or else rearrange the load so as to reduce the load on the overheating breakers.

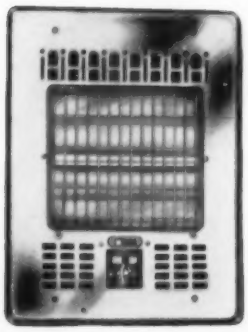
Sometimes overheating of air circuit breakers results from terminal connections that are not tight or soldered lugs are faulty and resulting in high resistance joints. The connecting cables to the breaker may be too small and overheating, with heat being conducted to the breaker parts. The remedy is to tighten all terminal bolts and nuts and change out connecting cables to larger sizes if existing cables are too small and the cause of the overheating.

Protecting cable against mechanical damage

A great many outages caused by wire and cable failure can be traced to mechanical damage of one kind or another. In general, this can be minimized by providing protection for cables in all exposed locations, and by instructing workmen not to hang clothes or tools on exposed wires.

Cables are frequently damaged by being bent sharply as they emerge from conduit and by being permitted to rub over rough edge of conduit. This can be avoided by eliminating sharp bends, providing bushing at end of conduit, and protecting cable at end of conduit with tape or rubber pad.

Cable buried directly in ground should be protected by a plank or concrete slab laid about 6 to 12 inches above the cable. This will eliminate possibility of cable being struck with pick or shovel when workmen dig nearby. It is a good plan to mark such cable runs.



AUTOMATIC RADIANT WALL HEETAIRE

. . . with the BUILT-IN THERMOSTAT!

Series 240
1000 to 1500 Watts,
120 or 240 volts, AC

- Economical—turns on-off automatically
- Costs less to install (no venting)
- Over 6,000,000 patented Neo-Glo elements in use prove quality and long life
- Glowing, infra-red penetrating heat
- Highly polished reflectors and Nuchrome front

Also Available in Manual Models, AC or DC

NOW!

One Source for EVERY ELECTRIC BUILT-IN HEATER NEED...

Priced for Every Budget

1000 to 5000 Watts... for a Room or a Home!

Model S281
1000 Watts 120 volts, AC
Model S282
1250 Watts 120 volts, AC

NEW! CEILING "Cherry Red" RADIANT HEETAIRE

- "Cherry Red" Radiant Heating Element — Completely Sheathed with special Nickel Chromium Alloy for Safety and Long Life.
- "EVEN HEAT" Distribution . . . High temperature UNIFORMLY—Evenly—Throughout the Room.
- PLUG-IN installation . . . pull regular house wiring into pre-Wired approved box for simple speedy installation.
- Built-In Junction Box . . . eight knockouts.

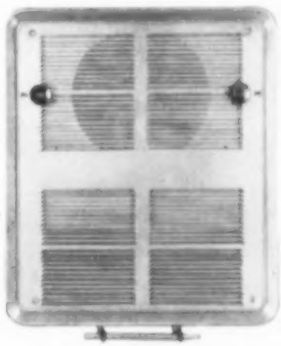
ALL HEETAIRES are carried in stock by your electrical jobber

MARKEL ELECTRIC PRODUCTS, Inc.
Founded 1920

LA SALLE PRODUCTS, Inc.
Buffalo 3, N. Y.

EXPORT DEPT. 15 MOORE ST. NEW YORK 4, N. Y.

Series
H-270-GT
2000 to 5000 Watts,
220/240 volts, AC



Beautifully Modern

HEAVY DUTY High Wattage Fan-Forced Wall Insert HEETAIRES

- Provide permanent or occasional heat in hard-to-heat rooms and buildings
- Turns self ON and OFF automatically
- Big 7¾" fan circulates heat throughout room or home **quietly**
- Automatic Re-set "Safety Switch"
- Simple, easy installation (no venting)

Also Available in portable and wall attachable models

NOTE: FREE DISPLAY ON REQUEST with H273GT Heetaire

Also Available . . . (230 Series) . . .

Built-In FAN-GLO HEETAIRES! Radiant (Infra-Red) Heat plus Fan-Forced Heated Air. 1250 to 3000 Watts—120 or 240 volts, AC—Automatic or Manual.

Send your check for a SAMPLE HEETAIRE at Contractor's Cost!

Please send me the following (Prepaid):

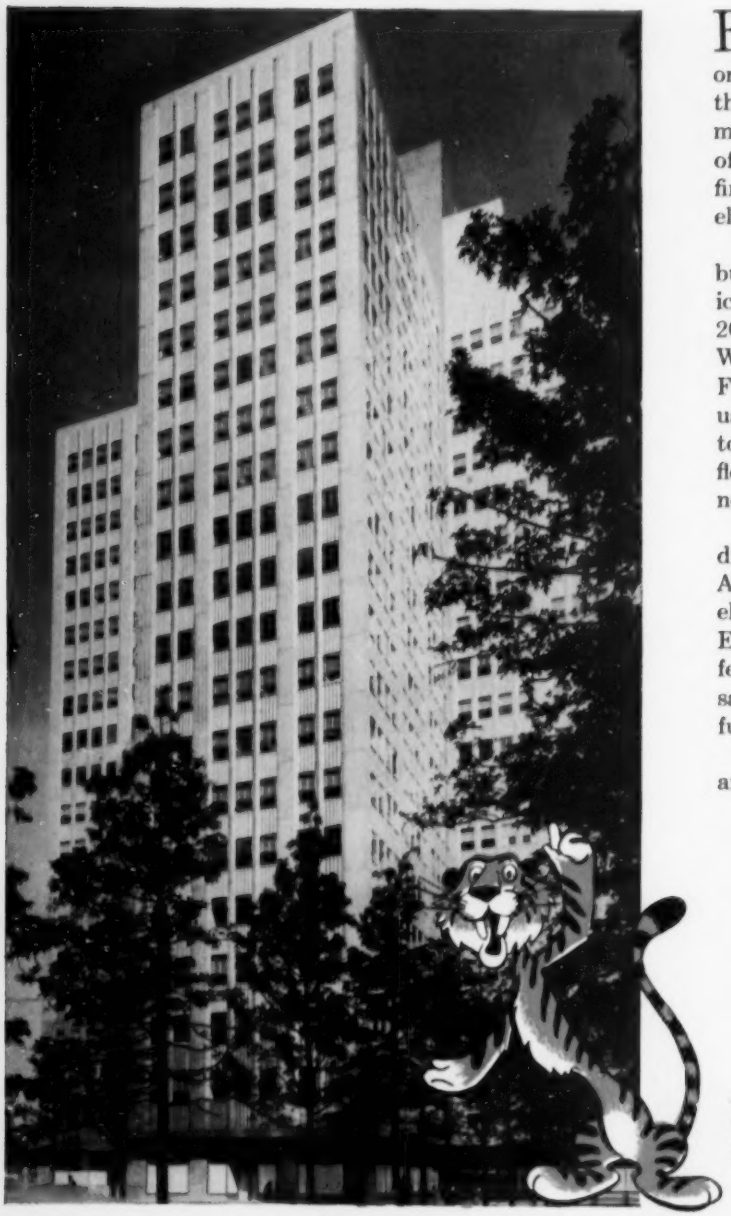
- ☐ **Model 241TN . . . 1000 Watts . . . only $11.65**
- ☐ **Model H273GT . . . 3000 Watts . . . only $46.00**
- ☐ **Model S281 . . . 1000 Watts . . . only $16.67**
- ☐ **Model H235KTZ . . . 2000 Watts . . . only $32.85**

Name _____

Address _____

City _____ State _____

6 miles of TIGER BRAND control the elevators in new Gateway Center buildings



ELEVATOR CONTROL CABLE leads a tough life. It must be light, to reduce the load on the car. It must be flexible, to withstand the continuous movement and vibration. It must be strong, to prevent the long length of cable from tearing itself apart. It must be fire-resistant, to guard against disastrous elevator shaft fires.

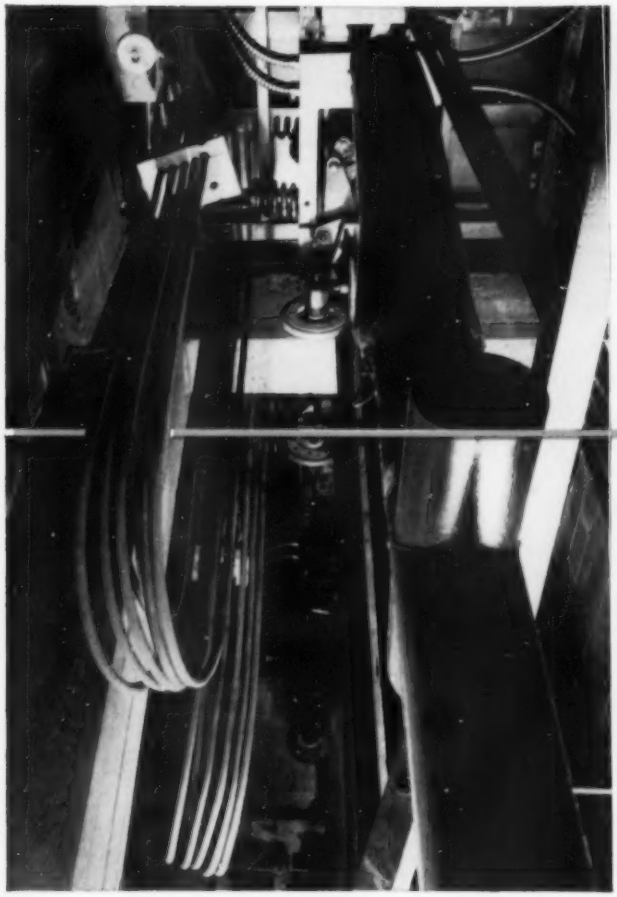
For the magnificent Gateway Center buildings in Pittsburgh, shown here, American Steel & Wire furnished some 6 miles of 20 and 30-conductor control cable for the Westinghouse Selectomatic elevators. Flame-resistant insulation and jackets are used, and each cable is reinforced with tough steel strands. The cable had to be flexible enough to withstand movement, but not so flexible that it would kink.

These are desirable features for many different kinds of electrical wire and cable. And although you probably don't build elevators, you can rely on any Tiger Brand Electrical product to combine all the subtle features that make for easy installation, safe, reliable operation, plus a long and useful life.

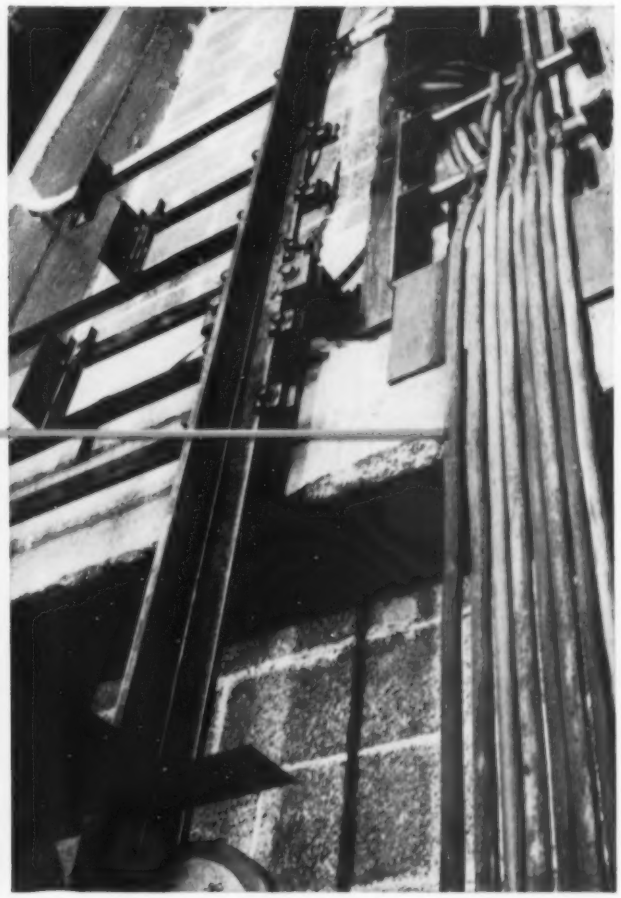
Send the coupon for more information on any Tiger Brand product.

AMERICAN STEEL & WIRE DIVISION,
UNITED STATES STEEL CORPORATION
GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO,
PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.,
SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

Gateway Center, famous Pittsburgh landmark, where Westinghouse Selectomatic Elevatoring matches calls, cars and floors to put elevators where they're needed, when they're needed.



Tiger Brand control cables are at the left. The hoist ropes, visible at right, are also made by American Steel & Wire.



Control cable terminal box is located half-way up the shaft. Flat steel rods projecting from elevator track actuate induction coil on car to control automatic leveling system.

A STANDARD TIGER BRAND CABLE FOR EVERY SPECIAL JOB!

- paper & varnished cambric cable
- asbestos wire and cable
- aerial, underground & submarine cable
- shovel & dredge cable
- mold cured portable cord
- machine tool & building wire
- special purpose wire & cable

SEND THE COUPON

American Steel & Wire Division
Room BE-85, Rockefeller Building
Cleveland 13, Ohio

Please give me more information about Tiger Brand cable for .....

Name .....

Firm .....

Address .....

City ..... State .....

USS Tiger Brand ELECTRICAL WIRE & CABLE USS

UNITED STATES STEEL

CONDUIT PUSHING UNDERGROUND
RIGID

COND. SIZE	HRS. "C"	LABOR COST PER FT. AT FOLLOWING RATES										
		$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75
1"	11.2	.14	.168	.196	.224	.252	.28	.308	.336	.364	.392	.42
1 1/4"	12.5	.1563	.1875	.2188	.25	.2813	.3125	.3437	.375	.4063	.4375	.4688
1 1/2"	14.4	.18	.216	.252	.288	.324	.36	.396	.432	.468	.504	.54
2"	16.9	.2113	.2535	.2958	.338	.3803	.4225	.4648	.507	.5493	.5915	.6338
2 1/2"	21.1	.2638	.3165	.3693	.422	.4748	.5275	.5803	.633	.6858	.7385	.7913

LABOR: INCLUDES CUTTING AND THREADING CONDUIT IN 5 FT. LENGTHS, ASSEMBLING AND PUSHING WITH A MANUAL PUSHER. (LEAVER AND NOTCHED STEEL RAIL).

8-55

FIBER CONDUIT FITTINGS (CONCRETE)
BELL ENDS AND PLUGS (ADD AS REQUIRED)

COND. SIZE	HRS. EA.	LABOR COST EACH AT FOLLOWING RATES										
		$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75
1"	.2	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75
2"	.25	.31	.38	.44	.50	.56	.63	.69	.75	.81	.88	.94
3"	.25	.31	.38	.44	.50	.56	.63	.69	.75	.81	.88	.94
4"	.3	.38	.45	.53	.60	.68	.75	.83	.90	.98	1.05	1.13
4 1/2"	.3	.38	.45	.53	.60	.68	.75	.83	.90	.98	1.05	1.13
5"	.35	.44	.53	.61	.70	.79	.88	.96	1.05	1.14	1.23	1.31
6"	.4	.50	.60	.70	.80	.90	1.00	1.10	1.20	1.30	1.40	1.50
		EXPANSION JOINTS (ADD AS REQUIRED)										
1"	.45	.56	.68	.79	.90	1.01	1.13	1.24	1.35	1.46	1.58	1.69
2"	.5	.63	.75	.88	1.00	1.13	1.25	1.38	1.50	1.63	1.75	1.88
3"	.55	.69	.83	.96	1.10	1.24	1.38	1.51	1.65	1.79	1.93	2.06
4"	.65	.81	.98	1.14	1.30	1.46	1.63	1.79	1.95	2.11	2.28	2.44
4 1/2"	.7	.88	1.05	1.23	1.40	1.58	1.75	1.93	2.10	2.28	2.45	2.63
5"	.8	1.00	1.20	1.40	1.60	1.80	2.00	2.20	2.40	2.60	2.80	3.00
6"	.9	1.13	1.35	1.58	1.80	2.03	2.25	2.48	2.70	2.93	3.15	3.38

LABOR: INCLUDES INSTALLING ITEMS AS NOTED.

8-55

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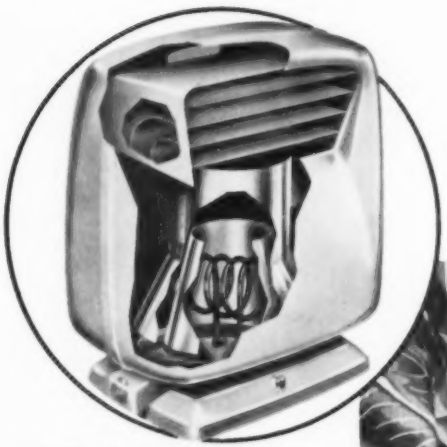
Announcing PREWAY Vectaire® Heaters

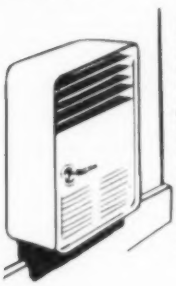
Beautiful
DURABLE
Maintenance-free



Model PV 151 T — Patented

A NEW Heating Principle

PREWAY'S Vectaire Convector operates on jet aviation's venturi principle. Expanding heated air is forced through a venturi orifice — which greatly speeds up the velocity of the air stream and eliminates all need for fans. Vectaire has no moving parts.



On the Wall

Perfect for semi-permanent or existing construction, this unit can be hung on a wall. Narrow depth keeps it from protruding far into the room. Clean line styling makes it look in place in any room. This is Model Number PV 152 and can be operated manually or actuated by a thermostat.

On the Floor

PREWAY'S Vectaire portable Heaters are contained in smartly styled cabinets as you can see. The case is always cool as there is practically no heat radiation. Just plug it in, set the thermostat to the desired temperature and forget it.

SPECIFICATIONS

Model No.	Watts	A.C. Volts	B.T.U.	Hgt.	Lgth.	Width	Wt. Lbs. Pkd.
*PV 151 M	1500	120	5122	21"	17"	11"	26
**PV 151 T	1500	120	5122	21"	17"	11"	26

*Equipped with toggle switch only.
**Equipped with automatic adjustable thermostat.

AS THE ONLY HEAT SOURCE		AS AUXILIARY HEAT SOURCE	
Outdoor Temperature	Area It Can Heat To 72°	Indoor Temperature	Area It Can Heat To 72°
60°	30'x30'	65°	30'x35'
50°	30'x20'	60°	30'x30'
40°	25'x20'	55°	30'x25'
30°	15'x20'	50°	30'x20'
20°	12'x20'	40°	25'x20'
10°	12'x15'		

NOW — a new name before America's foremost line of electric convectors

PREWAY has acquired the patents and production rights to Vectaire — the simplest and most trouble-free electric convector heater on the market. Here's how it operates:

Air, heated by range-type elements, is directed through a venturi orifice which does the work of a fan and propels a heated stream of air out into the room. This air stream — heated to a temperature of 200 degrees — moves at the rate of 135 feet per minute. There are no moving parts; there is no disturbing motor hum; there is nothing to get out of order! Just set the thermostat to the temperature wanted — and plug in. And thanks to this simplicity, Vectaire is priced well below what you'd expect convectors of this capacity to cost!

PREWAY — a multi-million dollar company, in the home appliance business since 1917 — also gives you the added assurance of a quality-built unit in every detail of construction. Call or write for full information and the name of the PREWAY distributor in your area.

PREWAY Inc.

9855 Third Street N., Wisconsin Rapids, Wisconsin

TYPES "R" - "RH & RW" - INSTALLED IN CONDUIT

WIRE SIZE	HOURS PER "M"	LABOR COST INSTALLED PER FT. AT FOLLOWING RATES										
		$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75
14	4.4	.0055	.0066	.0077	.0088	.0099	.011	.0121	.0132	.0143	.0154	.0165
12	4.8	.006	.0072	.0084	.0096	.0108	.012	.0132	.0144	.0156	.0168	.018
10	7.5	.0094	.0113	.0131	.015	.0169	.0188	.0206	.0225	.0244	.0263	.0281
8	8.8	.011	.0132	.0154	.0176	.0198	.022	.0242	.0264	.0286	.0308	.033
6	12.1	.0151	.0182	.0212	.0242	.0272	.0303	.0333	.0363	.0393	.0424	.0454
4	15.4	.0193	.0231	.027	.0308	.0347	.0385	.0424	.0462	.05	.0539	.0578
2	21.7	.0271	.0326	.038	.0434	.0488	.0543	.0597	.0651	.0705	.076	.0814
1	24.0	.03	.036	.042	.048	.054	.06	.066	.072	.078	.084	.09
1/0	27.9	.0349	.0419	.0488	.0558	.0628	.0698	.0767	.0837	.0907	.0977	.1046
2/0	31.7	.0396	.0476	.0555	.0634	.0713	.0793	.0872	.0951	.103	.111	.1189
3/0	35.5	.0444	.0533	.0621	.071	.0799	.0888	.0976	.1065	.1154	.1243	.1331
4/0	41.5	.0519	.0623	.0726	.083	.0934	.1038	.1141	.1245	.1349	.1453	.1556
250 MCM	45.8	.0573	.0687	.0802	.0916	.1031	.1145	.126	.1374	.1489	.1603	.1718
300 MCM	51.6	.0645	.0774	.0903	.1032	.1161	.129	.1419	.1548	.1677	.1806	.1935
350 MCM	56.1	.0701	.0842	.0982	.1122	.1262	.1403	.1543	.1683	.1823	.1964	.2104
400 MCM	60.6	.0758	.0909	.1061	.1212	.1364	.1515	.1667	.1818	.197	.2121	.2273
500 MCM	68.3	.0854	.1025	.1195	.1366	.1537	.1708	.1878	.2049	.222	.2391	.2561
600 MCM	74.6	.0933	.1119	.1306	.1492	.1679	.1865	.2052	.2238	.2425	.2611	.2798
700 MCM	80.5	.1006	.1208	.1409	.161	.1811	.2013	.2214	.2415	.2616	.2818	.3019
750 MCM	83.3	.1041	.125	.1458	.1666	.1874	.2083	.2291	.2499	.2707	.2916	.3124
800 MCM	86.1	.1076	.1292	.1507	.1722	.1937	.2153	.2368	.2583	.2798	.3014	.3229
900 MCM	90.9	.1136	.1364	.1591	.1818	.2045	.2273	.25	.2727	.2954	.3182	.3409
1000 MCM	95.2	.119	.1428	.1666	.1904	.2142	.238	.2618	.2856	.3094	.3332	.357
1250 MCM	104.7	.1309	.1571	.1832	.2094	.2356	.2618	.2879	.3141	.3403	.3665	.3926
1500 MCM	114.1	.1426	.1712	.1997	.2282	.2567	.2853	.3138	.3423	.3708	.3994	.4279
1750 MCM	123.5	.1544	.1853	.2161	.247	.2779	.3088	.3396	.371	.4014	.4323	.4631
2000 MCM	129.2	.1615	.1938	.2261	.2584	.2907	.323	.3553	.3876	.4199	.4522	.4845

LABOR: FOR PULLING WIRE AVERAGE RUN OF 14 FT. FOR SMALL SIZES AND 100 FT. PULLS FOR FEEDER SIZES (3 WIRE PULLS). (NO TAPS).

8-55

TYPE T & TW INSTALLED IN CONDUIT

WIRE SIZE	HRS. "M"	LABOR COST INSTALLED PER FT. AT FOLLOWING RATES										
		$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75
14	4.2	.0053	.0063	.0074	.0084	.0095	.0105	.0116	.0126	.0137	.0147	.0158
12	4.6	.0058	.0069	.0081	.0092	.0104	.0115	.0127	.0138	.015	.0161	.0173
10	7.1	.0089	.0107	.0124	.0142	.016	.0178	.0195	.0213	.0231	.0249	.0266
8	8.4	.0105	.0126	.0147	.0168	.0189	.021	.0231	.0252	.0273	.0294	.0315
6	11.7	.0146	.0176	.0205	.0234	.0263	.0293	.0322	.0351	.038	.041	.0439
4	14.9	.0186	.0224	.0261	.0298	.0335	.0373	.041	.0447	.0484	.0522	.0559
2	21.1	.0264	.0317	.0369	.0422	.0475	.0528	.058	.0633	.0686	.0739	.0791
1	23.8	.0298	.0357	.0417	.0476	.0536	.0595	.0655	.0714	.0774	.0833	.0893
1/0	27.6	.0345	.0414	.0483	.0552	.0621	.069	.0759	.0828	.0897	.0966	.1035
2/0	31.4	.0393	.0471	.055	.0628	.0707	.0785	.0864	.0942	.1021	.1099	.1178
3/0	35.1	.0439	.0527	.0614	.0702	.079	.0878	.0965	.1053	.1141	.1229	.1316
4/0	41.1	.0514	.0617	.0719	.0822	.0925	.1028	.113	.1233	.1336	.1439	.1541

LABOR: FOR PULLING ONLY. AVERAGE RUNS OF 14 FT. FOR SMALL SIZES AND 100 FT. PULLS FOR FEEDER SIZES. (3 WIRE PULLS).

8-55

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NEW 7½-acre plant (under one roof)
to provide
faster service for those who use...

WIRE BY PHELPS DODGE

Huge wire mill-warehouse offers immediate delivery service on wire and cable!

Phelps Dodge Copper Products Corporation's new plant at Yonkers, N. Y., covers seven and a half acres, is equipped with the latest facilities to service its customers.

A coordinated production and warehousing system in this plant enables Phelps Dodge to maintain stocks of every kind of building wire and cable ready for immediate filling of customer orders. Ten truck bays and a seven-car undercover freight siding will eliminate the usual loading delays, help speed shipments to their destinations. This new and exclusive system is an example of the careful attention Phelps Dodge has given to providing the finest service for its customers at this new plant.

On every wiring job, large or small, where top quality materials, expert workmanship and experienced "know-how" are called for, *it pays to rely on Phelps Dodge and your Phelps Dodge* distributor!

PHELPS DODGE COPPER PRODUCTS CORPORATION

SALES OFFICES: Atlanta, Birmingham, Ala., Boston, Buffalo, Charlotte, Chicago, Cincinnati, Cleveland, Dallas, Detroit, Fort Wayne, Greensboro, N. C., Houston, Jacksonville, Kansas City, Mo., Los Angeles, Milwaukee, Minneapolis, New Orleans, New York, Philadelphia, Pittsburgh, Portland, Ore., Richmond, Roanoke, Rochester, N. Y., San Francisco, St. Louis, Seattle, Washington, D. C.

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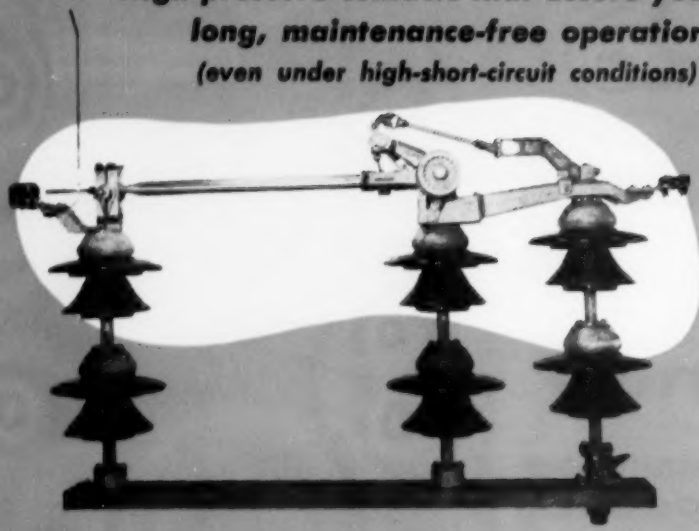

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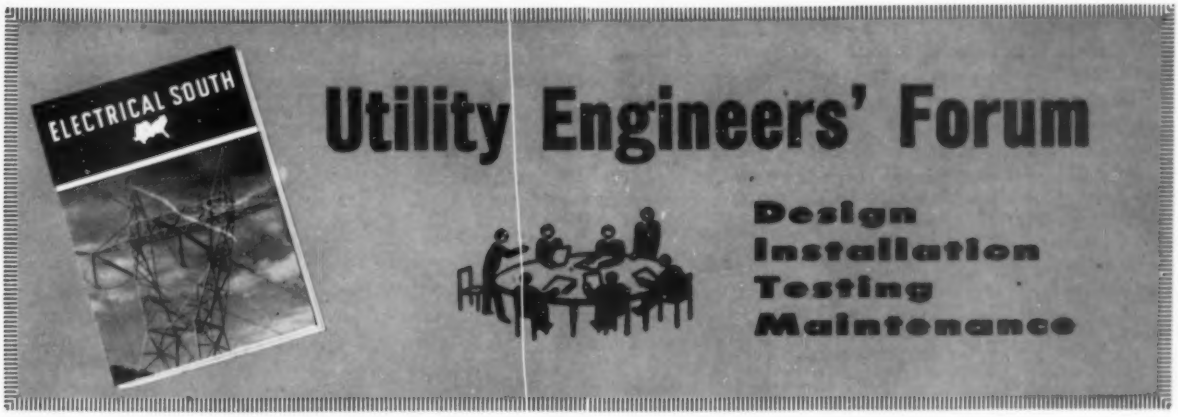

Viewpoint on higher secondary voltages

by J. B. Coltharp

Operating Superintendent
Beaumont Division, Gulf States
Utilities Co., Beaumont, Texas

◆ *Why a higher service voltage than the now widely accepted* 208Y-120 *volts or* 240 *volts three-phase delta?*

Many analyses, specific case studies, and some competitive bids have been made to prove that by utilizing the 480Y/277 volt service rather than the 208Y/120 volt, a saving of 8 to 25 per cent can be made in the installation of a large or even a moderate size distribution system for a commercial office building or unit similiar to a department store or super market.

Motor operation at these higher voltages is more satisfactory.

480 volt or related voltages are well established in industrial areas.

Until the development and wide acceptance of the fluorescent lamp, we had no readily available light source that could utilize the Y voltage of the industrially established 480 volt system. This universally adaptable fluorescent lamp, with proper ballast, is the key factor that has made possible the blending of the large lighting system to the 480 volt industrial system. Another way to state the same thing is; the high voltage secondary system has become desirable as lighting systems have become large loads and as a light source is available that can operate at a derivative of the industrially established 480 volt system.

The above listed items are highlights of the reasons why this higher voltage under discussion can be quite attractive to our customers.

What objections do we as operating utilities have to service at this higher voltage?

At the specific voltage of 480-Y/277 volts, we have to buy and stock a new group of transformers, and such transformers presently cost more, as well as increase our total operating inventory.

This 480Y/277 volt system gives us an additional secondary voltage to meter and operate.

Unless we are willing to make an extensive application of the self contained 480Y/277 volt meter, metering cost will be increased because there will be many small satellite loads clustered about the large loads and in the same building with this major load. These satellite loads will possibly require current transformers and potential transformers for their metering that would not be required at a lower voltage.

Under any course of events, a 120 volt supply cannot be eliminated. It must be provided for many small incandescent lamps and office machines.

208-240 volt faults are generally "self clearing" therefore overloaded or misapplied circuit interrupting equipment may not be too serious at these low voltages. On the 480Y/277 volt systems it seems to be necessary to confine the arc to the circuit interrupting equipment. 480 volt circuits do not appear to be "self clearing" which means circuit protection must be given more rigorous attention at this higher voltage.

One manufacturer states that standard NEC lead zinc fuses should not be generally used on these 480Y/277 volt systems as they will not adequately limit the flow of current under short circuit conditions but that it is necessary to use a more expensive fuse of the current limiting type.

There is the additional problem that rotating test standards have no 277 volt coil. The 240 volt coil in the standard will stand this higher voltage. Generally our company meter laboratories can readily calibrate the routine test standard coil at 277 volts.

What higher secondary voltages are being considered?

Some utilities have provided 416Y/240 volt service as a

compromise for the request of 480Y/277 volt because it can be served with existing transformers such as we have stocked for years. It seems, however, here we are back to the old troublesome problem similiar to serving the 240 volt motor from 208Y/120 volt secondary. Certainly we should give this problem the most rigorous analysis before we commit our companies to serving 440 volt equipment at 416 volts.

Where does the demand and pressure come from for the 480-Y/277 volt service?

One of our major manufacturers has advertised for several years in trade magazines in general and in leading architectural journals in particular, the advantages and economy of the 480Y/277 volt wiring systems.

The architects that are planning and executing the major buildings in the United States are driving hard through their clients to secure this voltage.

Our customers, once they have read or have been advised that they can save from 8 to 25 per cent on an item that is a substantial part of their total expenditure for the building, will naturally press the local operating utility for such service.

What should we do in response to the demand for the 480Y/277 volt or related voltages?

As a group of operating utilities we should decide at the earliest possible date what voltage we will render, that is, 416Y/240 volt or 480Y/277 volt or stay with our present network voltage of a nominal 208Y/120 volt.

Assuming that we are going to render a higher secondary voltage than the 208Y/120 volt or 240 volt three-phase delta, we as individual operating utilities should decide immediately on what mininum load we will serve at the higher voltage. It certainly appears the load to be served by overhead line should be at least 250 kw and network area loads should be at least 500 kw to qualify for services at 416Y/240 volt or 480Y/277 volt.

Our metering policy, with reference to this 416Y/240 volt or 480Y/277 volt service, should be clarified. Some metering groups and many safety groups think that current transformers and potential transformers should be used in metering 480 volt loads regardless of size. Some companies feel that small loads within the thermal capacity of the meters can be safely metered with the socket base type and not the "A" base type.

Extensive field checks show that some companies are applying the self-contained meter to the 480Y/277 volt system; and on the other hand, other companies do not permit the use of self-contained meters.

This metering and instrument transformer problem certainly needs clarifying at this voltage level, both from a safety and an economic standpoint.

How will the small customer in the same building be provided with 120 volt service? Shall the building owner provide 480/120 volts transformation and then submeter this customer at 120 volts? Around most developments such as large office buildings, super markets, and large department stores, there are always a few small independent lease operators that the operating utility would prefer to meter on regular company meters and the small customers generally have substantial amounts of 120 volt equipment.

The source for 120 volts must be provided either by the operating utility or by the building owner; if we let the situation develop to where the building owner provides the 120 volt service, the building owner will want to submeter the small customers, which violates most rate structures. If we provide the 120 volt service for the small satellite customers, we will have the added expense of extra transformers from the primary voltage or from 480 to 120 volts. As small operators are generally on the outer fringes of the large developments, if we provide 120 volts at one location in the building only, then the small customer may have a very long 120 volt service line.

As an operating utility we should decide on a broad area base as to what voltage we would provide in advance of actual request.

A questionnaire was distributed to a substantial number of representative utilities of this area. Over half of the respondent companies indicated they were now serving or were ready to serve the 480Y/277 volt load within the framework of their respective company's policy. One of these companies, it seems, will actually promote this voltage system to its customers.

Prospective big, high revenue customers building large office buildings and super markets are asking for this voltage. The architects throughout the United States are asking for this 480Y/277 volt service and the consulting engineering group is pressing the issue. Our companies should decide at an early date what their answer will be to this new and intriguing problem.

Gulf States Utilities Company's policy with respect to higher secondary voltages.

Gulf States Utilities Company will render service at 480Y/277 volts to loads on its *overhead* system; where such loads are at least 250 kw and where, in the opinion of the company, it is not practicable to serve that load from existing or contemplated secondary systems. The company is now preparing to serve a large super market in Port Arthur, Texas, having a load of around 300 kw.

For the present, the company will, as equipment is available, make a number of socket meter installations without metering transformers for this 480Y/277 and 480 volt delta service up to the thermal capacity of the meter.

(This article is adapted from a discussion presented before a recent meeting of the Engineering and Operation Section of the Southeastern Electric Exchange.)

Circuit breaker designed for one cycle opening

ELECTRICAL engineers were told at the recent AIEE Summer General Meeting of a new circuit breaker reported to have an interrupting time of one cycle and reclosing time of 20 cycles. It is designed to operate in circuits up to 15,500 volts. The breaker will interrupt at one cycle, reclose twice before locking out in the case of a persistent fault. The developers say it offers optimum protection for distribution circuits.

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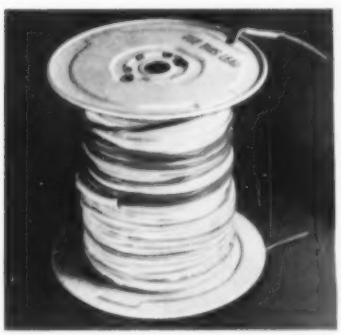

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Subtransmission systems —

as seen from the distribution substation

Part I

by D. J. Hubert

Electric Utility Engineering
General Electric Company
Schenectady, N. Y.

◆ THIS ARTICLE discusses the four general types of subtransmission and their features, equipment, methods available for terminating subtransmission circuits, and means of providing primary protection for both the Master and the Single Circuit Unit Substations.

Subtransmission systems may be classified into four general arrangements — radial, loop, multiple and grid. The choice of subtransmission system is dependent upon service continuity and voltage regulation requirements, present and possible future loads, and cost. The following discussion is intended to provide a basis for comparing the various system combinations.

Radial subtransmission

A "radial" system as shown in Fig. 1, using a simple, single bus radial type substation, has the lowest cost of all the various types of subtransmission systems. This system is simple, low in cost, and is particularly applicable to low-density load areas or small spot loads.

In spite of the probability of occasional subtransmission line failures and the possibility of transformer or bus failure, there has been a marked trend toward this type of subtransmission in recent years because of its low first cost. The radial system may be readily expanded to either a loop or a multiple subtransmission system if future load or service continuity requirements demand such a change.

Records of subtransmission line outages per hundred circuit miles per year are usually kept by operating engineers. By carefully

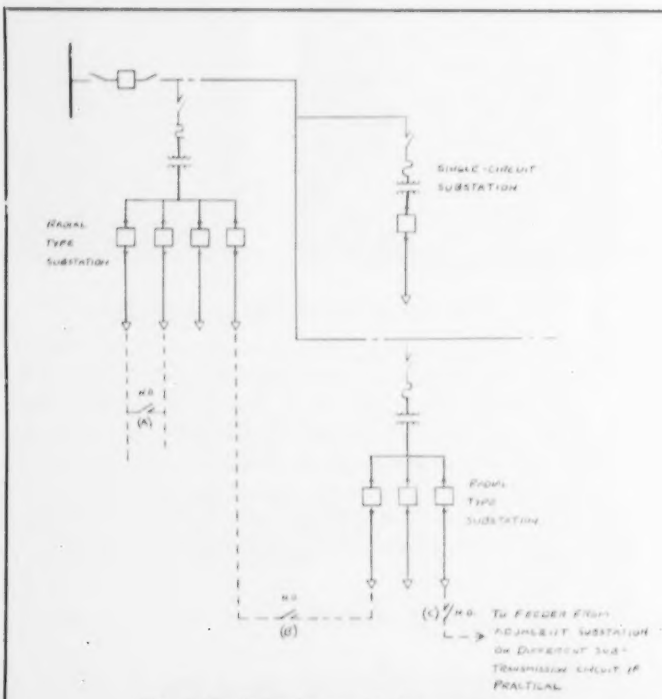

Fig. 1. Radial subtransmission system

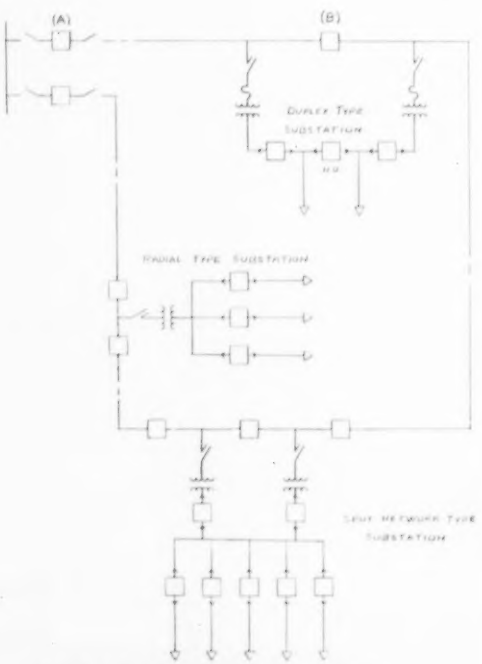

Fig. 2. Loop subtransmission system

checking records of this nature with the degree of continuity of service which a given load area justifies, it can be determined whether or not it is desirable to install a radial system, or to provide the added reliability of one of the more costly systems.

In the radial system there is inherently only one path of power flow from source to load. Therefore, an outage on the subtransmission line results in interruption of service until the trouble is eliminated and the line is again energized. When it is possible to arrange cutover switches between feeders of substations fed from different subtransmission circuits (Switch C, Fig. 1), it would permit restoring service at the one substation in case of a subtransmission outage. System geography does not permit such cutover facilities in most cases.

Loop subtransmission

The loop subtransmission system as shown in Fig. 2 has increased service reliability over the radial system in that each substation has two separate supplies. For many situations, it provides the lowest cost method of providing two separate sources of power to each substation because only one circuit is required between adjacent substations. A rather high degree of reliability is possible since the two separate sources are usually over two completely different paths, and are thus not subject to the same local disturbances, such as lightning, fires, etc. The lower cost of the single looping circuit as compared to a two-circuit subtransmission system is offset somewhat by breakers being required at each substation and sometimes by more complicated relaying requirements.

One limitation for loop subtransmission is the voltage drop at the last substation along the line when the loop is broken. For example, in Fig. 2, if the breakers (A) and (B) are opened to take the line section between (A) and (B) out of service, the entire load must then be fed through the remaining circuit. The total load on the loop is limited by the allowable voltage drop at the Duplex type substation under this condition.

The distribution substations connected to a loop subtransmission system may incorporate one of several switching schemes on the primary side. The choice of scheme depends largely upon the service continuity required, with the corresponding cost kept in mind. There are three basic arrangements for single-transformer substations as illustrated in Fig. 3A.

A loop subtransmission line with a sectionalizing breaker at the substation is shown in scheme No. 1. The substation is connected through a disconnect switch to the line on both sides of the breaker. As illustrated, one switch is normally open while the other is closed. In the event of a fault on the portion of subtransmission line to which the substation is connected, the sectionalizing breaker opens, thus de-energizing the line and the substation. The substation may be energized by manually opening the one disconnect and closing the other to the section of the loop which is still energized. With this scheme, the transformer is usually protected from internal fault currents by fuses as illustrated, or in some cases by remote switching of a subtransmission line breaker. Both means of primary protection of the substation are discussed in more detail in later paragraphs.

Scheme No. 2 is essentially the

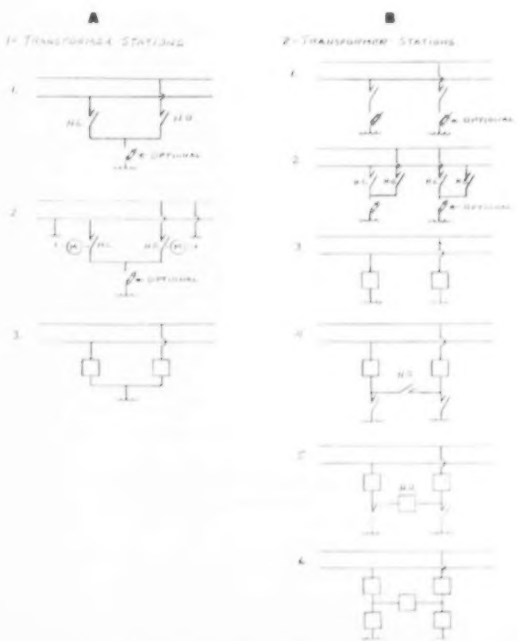

Fig. 3. Loop subtransmission stations

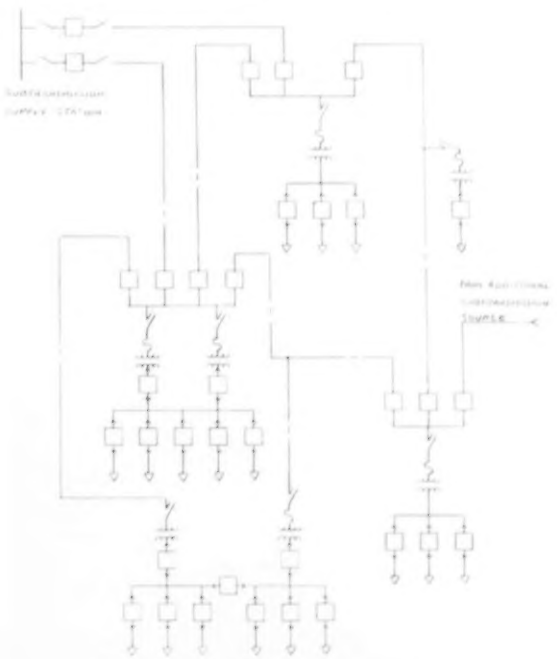

Fig. 4. Multiple subtransmission system

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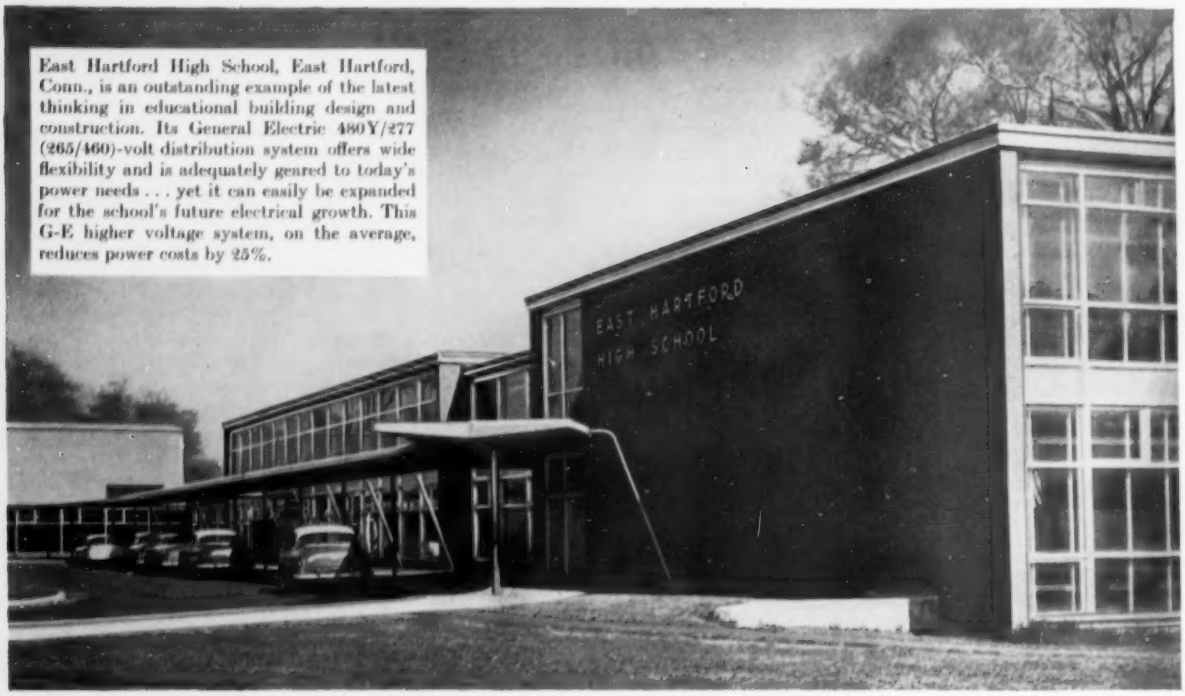

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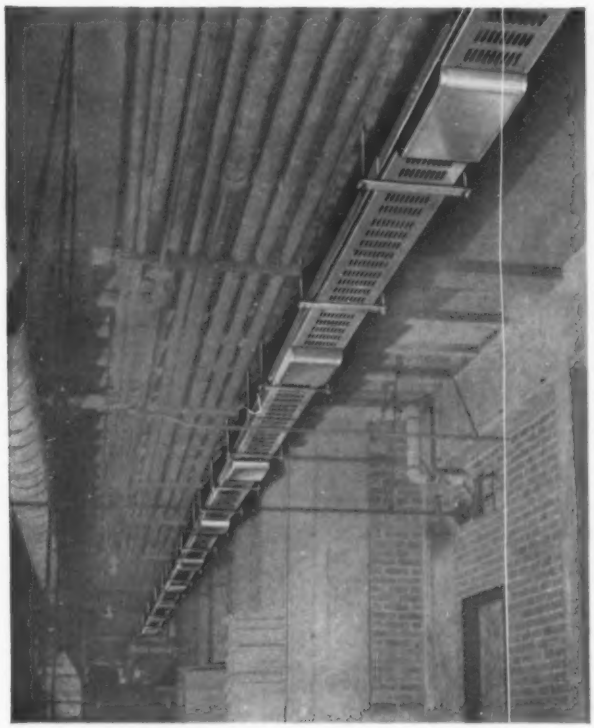
LID ON SOARING SCHOOL CONSTRUCTION COSTS

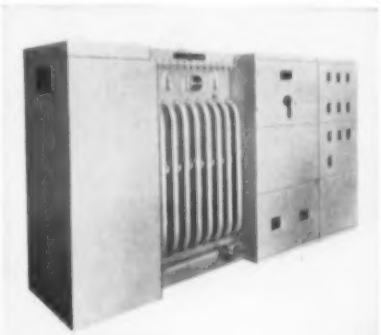


Busways—Flex-A-Power* Busways at East Hartford High School. These are available with either copper or aluminum bus bars, are erected easily with "building block" sections of standard lengths. Prefabricated fittings allow rapid assembly tailored to various plant contours.

Stage Lighting Switchboards—Both mechanical and electronic types are available to exacting specifications for schools, TV studios, auditoriums and theaters. Dead-front construction provides maximum safety of operation, even for non-professionals. Easy-to-use controls. Factory pre-wired.

Control Centers—New G-E Type DA7093 motor control center with short-circuit rating of 50,000 amperes occupies 50 percent less floor space than conventional equipment. Standardized, self-supporting.

Panelboards—Types NAB, NHB, NLTQ, NLTQX, NTP, and NTC for lighting; Types NCB, CCB, Swing-Wa* and Converti-Fuse* panelboards for power distribution. Full line. Factory assembled.



Sectional Type Distribution Center Unit Substations—Factory assembled to reduce installation cost. Short secondary feeders in load center system mean low voltage drop. Easy-to-order arrangements.

*Registered Trade-mark of General Electric Company

Progress Is Our Most Important Product

GENERAL ELECTRIC

same as No. 1 except that the disconnect switches are motor-operated. When the faulted section of the loop subtransmission line is de-energized, the voltage relays actuate the motor circuits, automatically disconnecting the substation from the de-energized section of line, and connecting it to the section which is still energized.

While scheme No. 3 is more expensive in that two sectionalizing breakers are incorporated, it offers a more complete and faster primary protection to the substation as well as the line. Service continuity is also improved, since a fault on either section of the loop subtransmission line will be isolated without even a momentary interruption of power to the substation. In addition, this scheme allows differential relaying of the substation transformer and the primary bus between the transformer and the breakers without requiring transfer tripping of any remote breakers.

The switching scheme arrangements which are available on the primary side of two-transformer substations connected to a loop circuit are illustrated in Fig. 3B.

Scheme No. 1 provides for sectionalizing the line when a fault occurs on the line, and allows the substation to be fed from only the one transformer which is connected to the energized section of line. Differential protection of the transformers requires transfer tripping of the remote breakers.

Scheme No. 2 duplicates scheme No. 1 except that the two additional disconnect switches provide a means by which the de-energized transformer may be manually switched to the line on the energized side of the sectionalizing breaker.

Scheme No. 3 provides for a section of the subtransmission loop to be automatically de-energized, and still allows the substation to be fed by both transformers through the remaining section of the line. If differential protection of the transformers is desired, both breakers would open for a fault on one transformer and the entire station would be dropped. Power cannot be restored until the faulted transformer is isolated by opening its primary disconnect switch and main secondary breaker.

Scheme No. 4 provides for both transformers to be operated from one side of the loop when the other side is opened, and provides for differential protection of the transformers without tripping remote breakers. If a fault occurs in one transformer, it is automatically de-energized, and the loop is opened until the faulted transformer is isolated.

Scheme No. 5 enables the transformers to be protected by differential relaying without opening the loop, but does not allow the substation to be fed through both transformers when there is a fault on the subtransmission line.

The arrangement of scheme No. 6 provides the most complete protection of all the above schemes in that it automatically isolates a faulted transformer without breaking the loop, and allows both transformers to be energized when one side of the subtransmission loop is de-energized. Although this scheme provides the best protection, it is not economical for most applications.

Multiple subtransmission

The multiple subtransmission system shown in Fig. 4 is characterized by two or more circuits, over the same or different rights

(*Continued on page* 108)

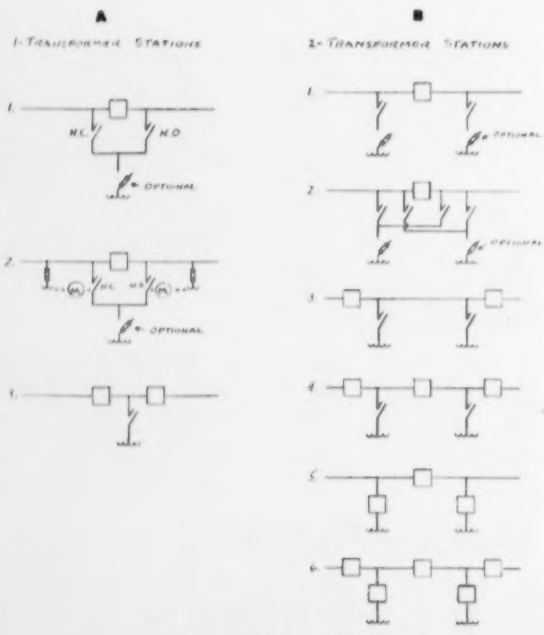


Fig. 5. Multiple subtransmission stations

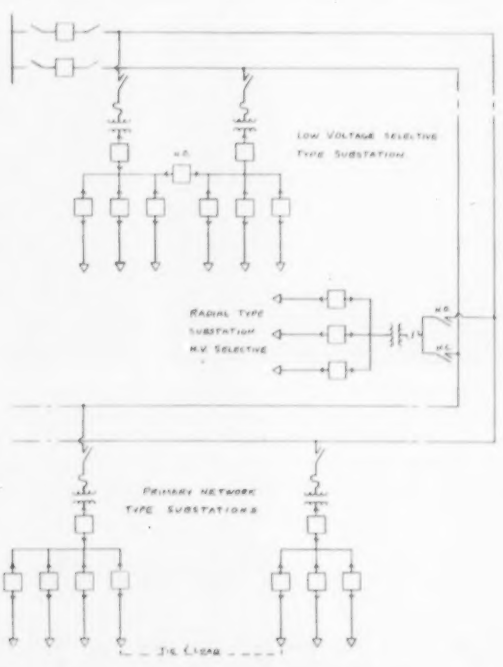
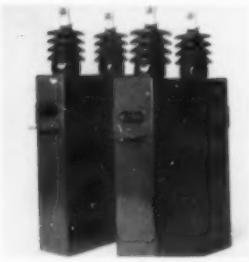


Fig. 6. Grid subtransmission system

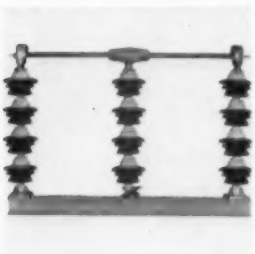
Notes on new utility equipment

Cornell-Dubilier has announced a new 33 1/3 kvar high voltage power capacitor, which was designed to meet the ever-increasing utility demand for larger concentrated blocks of reactive kva at lower weight and cost levels. Only 10 per cent heavier than conventional types, this new C-B unit provides over 30 per cent additional corrective kvar. The improved capacitor will provide 300 kvar with nine units, instead of the usual 12 25-kvar units. Or, 12 33 1/3-kvar units will expand pole mounted installations to 400 kvar blocks as against a maximum of 300 kvar now possible. The company estimates that this capacitor will result in more than 10 per cent savings in cost per kvar.



A new line of single-phase induction voltage regulators is available from Westinghouse Electric Corp. Outstanding feature of the new regulators is their completely static control. To insure minimum maintenance all moving parts in the voltage sensing and motor driving elements have been replaced by magnetic amplifiers in permanently sealed units. Also, the time delay element has been eliminated, resulting in a narrower effective bandwidth.

Southern States Equipment Corporation has announced the availability of Type RDC, a new double side break switch. It will be offered in voltage ratings of 34.5 kv and above in continuous current ratings of 600, 1200, and 2000 amperes. High pressure AMPLITACT contacts, a minimum number of current inter-change points, shuntless design and wide angle blade rotation to open and close are a few of the features incorporated in the design of the RDC. In addition, the switch is designed with smooth corona-resistant contours resulting in extremely low radio influence voltages. All mechanisms are shielded for complete protection against icing and corrosive contaminants.



New three and five KVAR single phase, 240-volt capacitors have been added to the capacitor line of Line Material Co. The new units are designed for power factor correction on secondary distribution circuits and meet all NEMA standards.

A. B. Chance Company has announced the addition of Type "K" (fast) and Type "T" (slow) fuse links to its regular line of Matthews fuse links and a new package design for the Type "K" and "T" links. The new links are precision-engineered and precision manufactured to meet EEI-NEMA standards.

A new current transformer designed for indoor service and suitable for operating relays and control devices has been announced by General Electric's Instrument Dept. Designated as Type JKS-3, it has been designed with extra high mechanical and thermal ratings to adapt it for relay and control device operation. It is designed for use on circuits not exceeding 5,000 volts, line-to-line, and is available in all standard, single, primary-current ratings 15 to 800 amperes inclusive. It is designed for continuous operation at 100 per cent of rated current in 55° C ambient temperature without exceeding the allowable 30° C rise.

A new lineman's belt—the Bak-Saver—has been introduced by Miller Equipment Co., Inc. Thoroughly tried and tested, this new belt is reported to eliminate the hazard of falling out of the saddle and therefore permits the lineman to be higher on his work. Because of this, the company reports, he can now work further out from the pole with greater comfort and freedom.

A new capacitor switch bracket that permits the economical and simple conversion of fixed pole-top banks to automatically switched units is now available from Westinghouse Electric Corp. The galvanized steel bracket enables users to mount type CSO capacitor switches on standard three- or four-unit capacitor mounting brackets.

News of the industry

edited for Southern readers

Louisiana NECA members support IAEI meeting

AT A RECENT informal meeting in the South Louisiana Chapter office of the National Electrical Contractors Association in New Orleans, La., John Nunez, president of the South Louisiana Chapter of NECA, presented Walter Mangin, president, George Welman Chapter, International Association of Electrical Inspectors, with a check for $1,000.

This was tangible evidence, Mr. Nunez stated at the presentation, of his chapter members' belief in the coming Southern Section meeting of IAEI and the NECA members' desire to participate in this meeting.

The Southern Section, IAEI, meeting is scheduled to be held at the Jung Hotel in New Orleans, October 3-5, 1955.

Others in attendance at the check presentation ceremonies were: R. C. Pflueger, treasurer, South Louisiana Chapter, NECA; J. C. Young, secretary-treasurer, George Welman Chapter, IAEI; George W. Flash, vice-president of the IAEI chapter; Alvin A. Hero, chairman, construction finance committee, IAEI; Michael Elgutter, assistant manager of the NECA chapter; and Rudolph Viener, Jr., secretary-manager of the South Louisiana NECA chapter.

Walter Mangin, center, president, George Welman Chapter, IAEI, receives a check from John Nunez, president, South Louisiana Chapter, NECA, for use in planning the forthcoming Southern Section IAEI meeting in New Orleans. From left to right, participants in the presentation are: R. C. Pflueger, Mr. Nunez, J. C. Young, Mr. Mangin, George W. Flash, Alvin A. Hero, Michael Elgutter, and Rudolph Viener, Jr.

Aggressive selling of electric heat urged

IN A TALK highlighting vital factors of selling electric home heating, Stanley B. Aronson, sales manager of Berko Electric Manufacturing Corp., was the featured speaker at a recent "graduation meeting" of electrical contractors which was sponsored by the Electrical League of Indianapolis, Ind. Speaking at the new WESCO Auditorium before a group which had recently completed an intensive course of instruction on selling electric home heating, Aronson pointed out that electric home heating offers outstanding opportunities to aggressive salesmen.

Nine out of 10 home owners are prospects for some type of electric heating, the Berko sales chief declared. "If you make a major selling effort, you will be surprised at the large volume of business you can do," he said. "Bear in mind, there are many consumers in this area who are much further advanced in their thinking about electric heating than you can appreciate. This market can readily be tapped by aggressive dealers in electric heat."

"In your eagerness to do business do not forget to make a profit," Aronson warned. "If you give your jobs away for nothing, you will hurt your own future business. To prosper and expand in the electric heating field, you must advertise and identify yourself with electric heating."

S. B. Aronson

Aronson cited examples where energetic selling and sales promotion, plus close follow-up of leads, have proved to be highly resultful in selling electric heating. He pointed out that the electrical contractor is in a particularly advantageous position to secure electric home heating contracts because he is usually called in early to bid on new construction. Often, merely by asking the question, "How are you going to heat this place?" the electrical contractor is well on his way to a sale, he said.

Sangamo to build in South Carolina

THE SANGAMO Electric Co., Springfield, Ill., recently announced plans for a new manufacturing plant to be built in Pickens, S. C. The plant will be operated by the Pickens Electric Manufacturing Co., a division of Sangamo Electric. Daniel Construction Co., Greenville, S. C., will build.

The new plant will consist of more than 100,000 square feet of

Field forces are always within earshot with Bell System mobile facilities

You get the most efficient use of company vehicles when you can reach your maintenance crews by telephone at any time. The Bell System offers several types of Mobile Radio arrangements.

General Service: Your fleet can be reached from any telephone. Also, your field forces can call any telephone reached by the Bell System.

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Signaling Service: Your maintenance crews can be signaled over this one-way service and carry out any prearranged instructions, such as calling your office from a public telephone.

Private Mobile Systems: Radio equipment will be provided and maintained for eligible radio licensees. You get the advantages of Bell System engineering, installation and maintenance experience.

Mobile communications can be engineered to meet your specific requirements. For a free survey of your needs, simply call your Bell Telephone representative.

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TELEPHONE TELETYPEWRITER MOBILE RADIO
TELEMETERING AND REMOTE CONTROL CHANNELS

floor space and will give employment to approximately 500 workers. It is to be of the most modern construction, totally enclosed and completely air-conditioned.

The factory will manufacture electrolytic capacitors, electronic devices that are presently being manufactured at the company's plant in Marion, Ill. Existing equipment at the Marion plant will be installed in the new plant.

Markel heater elements have lifetime guarantee

INAUGURATION of a lifetime guarantee on its Neo-Glo heating elements in every portable Heetaire in their 1955-56 line has been announced by Markel Electric Products, Inc., Buffalo, N. Y.

Every Neo-Glo element, the manufacturer certifies, is guarantee for the lifetime of the portable Fan-Glo Heetaire and, if for any reason, it ever burns out, a new element will be given absolutely free.

There are two of these patented Neo-Glo elements in each of the six models in the 1955-56 Markel Fan-Glo Heetaire line of electric portable space heaters.

NAED elects five new Southern members

FIVE ELECTRICAL wholesale distributors from the Southern region have recently been elected to membership in the National Association of Electrical Distributors. They are among nine new members of NAED.

They are Gulf Coast Electrical Supply, Inc., 1540 19th St., N., St. Petersburg, Fla.; Sterett Supply Co., 1318 Laredo, Corpus Christi, Texas; Rawlinson Electric Supply Corp., 2731 Taylor St., Dallas 26, Texas; Service Electric Supply Co., Inc., 115-119 E. Reno, Oklahoma City, Okla.; and Wholesale Electric Supply Co., 3821 McKinney, Houston 3, Texas.

Jay Lighting opens Houston warehouse

JACK GOLDBERG, president of Jay Lighting Manufacturing Co., Inc., Brooklyn, N. Y., has announced that his firm is now warehousing their complete line in Houston, Texas. Fred Walters is in charge of the Jay warehouse, which is located at 2020 Congress Ave., Houston.

An editorial

No time for frustration

by W. J. Rooke, Chairman of the Board
W.R.C. Smith Publishing Co.

THE OLD SAYING that nothing is so certain as death and taxes is indicative of the feeling of futility and frustration that confronts the average citizen when he hears of the constantly mounting cost of government. The astronomical figures involved, and the general tendency on the part of bureaucrats to endeavor constantly to expand their operations and budgets, leave most citizens with a feeling of helplessness insofar as a remedy for the situation is concerned.

Past recent experience, however, shows that something can be done to increase efficiency in government and reduce the mounting cost of government. The Hoover Commission which functioned in the early postwar years, studied the reorganization of government departments carefully and offered 175 recommendations for increased efficiency and economies. Of these, some three-fourths were adopted and have already resulted in substantial savings.

Now, a *new* Hoover Commission has been studying the organization of the Executive branch of the government. Thirteen task forces set up by the Commission have conducted studies to determine the causes of waste and inefficiency in the federal establishment.

The personnel of these task forces includes some 200 experienced business and industrial executives—men who have been outstandingly successful in establishing efficiency and economy in their own organizations. Among them are such leaders as Harry Erlicher, former vice-president and purchasing agent of General Electric; Charles R. Hook, chairman of Armco Steel; Thomas D. Jolly, vice-president of Alcoa; Admiral Ben Moreell, chairman of Jones and Laughlin Steel; and Charles J. Stilwell, president of Warner and Swasey.

The Commission task forces have found that the possibilities for savings, without impairing government functions, are enormous. These are typical of possible savings: the Defense Department could lop off $2 billion a year through better inventory control and more efficient buying; economy in handling paper work of government could save another $1 billion; improvement in civilian employee administration, reducing the 25 per cent annual turnover, together with some reduction in numbers, would save $1 billion without hardship.

The Hoover Commission has completed the major portion of its studies and has rendered its reports and recommendations to congressional committees and administrative agencies concerned. Already, opposition has developed on the part of bureaucrats to many of the recommendations. Congress has done little about these recommendations, mainly because it has received few expressions of favorable public opinion, urging it to act on these recommended changes.

What the reader of this magazine needs to realize is that the responsibility for getting these economies adopted rests with himself in the final analysis. You are the man who votes and, because the men in Congress from your area are particularly sensitive to votes, the opinions you give them will carry weight.

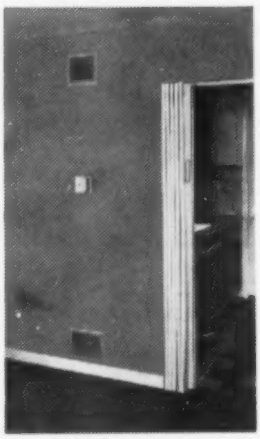
If you are like the average businessman, you are completely tired of having to pay and pay and pay a lot of your money in federal taxes, only to watch it go down the drain in wastefulness and extravagance. Now, you can do something about it—you have a compelling reason to write your Senators and Representatives in Washington to say that you are tired of high federal taxes and federal extravagance, to say that you want them to study the Hoover Commission recommendations and to put these recommended economies into effect. Your nine cent investment today in three letters will pay handsome dividends in future years!

A NEW TREND
IN MODERN HOME HEATING

Electrend

ELECTRIC CIRCULATING AIR HEATING SYSTEMS

REQUIRES NO SPACE



NO FURNACE ROOM
Space ordinarily needed for furnace can be utilized as extra living area.

ZONE CONTROL
Each room can be kept to desired temperature. No one room becomes overheated in order to have another one warm.

NO OIL TANK
Eliminates a smelly, unsightly oil tank — either inside or outside.

CLEAN
No fumes or odors — no streaked walls.

EASY TO INSTALL

NO DUCTS
Rooms can be arranged to better advantage because each room has a separate heating system.

NEW CONSTRUCTION
Makes for speedier and simpler construction . . . Reduces original building costs.

EXISTING CONSTRUCTION
Simple installations for existing homes are easy.

SAFE
No chimney needed — no gases or fire danger.

ECONOMICAL TO OPERATE ELECTREND'S unique principle assures moderate operating costs.

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The Electric Supply Co.
Atlanta, Georgia

Electrend Distributing Co.
St. Petersburg, Florida

Southern Electric Supply Co.
Meridian, Mississippi

A. F. Epting Co.
Charlotte, North Carolina

Dixie Appliance Co.
Roanoke, Virginia

Best Supply Co.
Chattanooga, Tennessee

Dixie Appliance Co.
Bluefield, W. Virginia

Dunbar Metal Supply Co.
Charleston, W. Virginia

M. Rosentretter & Co.
St. Louis, Missouri

Triangle Elec. Supply Co.
El Paso, Texas

Watson Electric Supply
Dallas, Texas

Cummins Supply Co.
Fort Worth, Texas

Additional Exclusive Distributor Franchises Available

Write today for complete details

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Electrend Products Corporation

NEMA

ST. JOSEPH, MICHIGAN

Florida contractors plan annual convention

THE 1955 CONVENTION of the Florida Association of Electrical Contractors will be held at the George Washington Hotel in Jacksonville on September 30, October 1 and 2, 1955, according to a recent announcement by L. L. Dick, state manager of the association.

James Dandelake, president, Miller Electric Company of Florida, Jacksonville, is chairman of the 1955 FAEC convention committee. Axel Ornberg, Orlando, Fla., is president of the state group.

Crisp County contractors, dealers form association

ORGANIZATION of the Crisp County Electric Dealers and Contractors Association in Cordele, Ga., with an initial membership of 25, has been announced.

Officers of the new association elected are John Barge, president; John Burnam, vice-president; and Floyd Keeney, secretary-treasurer. Five directors named to serve the group are James Bowen, Lester Brown, Charles Tarver, George Pass, and Buddy Riles.

Dan Sinclair, manager of the Crisp County Power Commission, presided over the organizational, dinner meeting.

Houston contractor opens second store

GRAND OPENING of Wade Electric Company's Store No. 2 was held recently at 6706 South Main in Houston, Texas. The company's main store is located at 1233 Waugh Drive. At present, the electrical contracting firm is specializing in the sale, installation, and wiring of air conditioners.

Preway buys Federal electric heater line

PREWAY, INC., Wisconsin Rapids, Wis., has purchased the Federal Products Division of the Federal Malleable Co., Milwaukee. The sale covered the patent rights to the electric heaters produced by Federal and included all inventory, tools, dies and special machinery used in manufacturing, which are being moved to Wisconsin Rapids.

According to J. O. Ellis, Preway president, who made the announcement, the Federal line will continue to be marketed but will now carry the Preway name; and Preway will further expand sales through its own organization of distributors.

Preway manufactures domestic oil and gas heaters, gas and electric built-in ranges, electric ranges, and gas ranges for the mobile home industry.

"Plans are also underway," said Mr. Ellis, "to further develop and expand the electric heater business through the addition of new units to fill out the line that Federal formerly made."

ELECTRIC HEAT STUDIES — G-E's Development Engineer S. G. Reque uses a "house of wire"—an electrical model of an actual dwelling—to determine home heating requirements more precisely than has heretofore been possible. A maze of electric circuits, used in conjunction with a computer, enables the General Electric engineer to learn how heating requirements are affected by such things as high wind, sharp overnight temperature dips or "storage" of heat by walls and furnishings.

Cary Chapman appointed CBS-Hytron sales agent

APPOINTMENT of Cary Chapman & Co., 672 Whitehall St., S. W., Atlanta, Ga., as sales representatives for the CBS-Hytron line of electronic radio tubes and television picture tubes has been announced.

The Chapman firm, in business as manufacturers' representatives since 1925, will cover the entire Southeastern area for CBS-Hytron, including the States of Georgia, Florida, Alabama, Tennessee, Mississippi, Louisiana, North Carolina, South Carolina, and Virginia.

Chapman warehouses in Atlanta, Greensboro, N. C., and New Orleans, La., will maintain a complete stock of the line.

Arkansas wholesaler celebrates 50th year

THE 50TH ANNIVERSARY of the founding of the Treadway Electric Co., Little Rock, Ark., reported to be the first electrical wholesaler in the State of Arkansas, was commemorated with a dinner given at the Albert Pike Hotel recently by General Electric's Lamp Division.

Treadway executives and employees and their families were guests at the dinner. Hosts for G-E were G. J. Ellis, district manager of the manufacturer's Lamp Division, and R. C. Pilcher, the division's Arkansas representative.

New Emerson Electric warehouse dedicated

A NEW 100,000 - square - foot warehouse has been dedicated and put into service by the Emerson Electric Manufacturing Co., St. Louis.

The steel and concrete structure, which is located adjacent to the main Emerson plant, was dedicated in recent ceremonies conducted by W. R. Persons, Emerson president.

The new Emerson warehouse eliminates the need for rental by

Dates Ahead

Electrical Conference of the Petroleum Industry, AIEE, Shamrock Hotel, Houston, Texas, Sept. 12-14, 1955.

Public Utilities Association of the Virginias, 37th Annual Meeting, Greenbrier Hotel, White Sulphur Springs, W. Va., Sept. 15-18, 1955.

Southeastern Electric Exchange, Engineering and Operation Section, Charlotte Hotel, Charlotte, N. C., Sept. 22-23, 1955.

Edison Electric Institute, Transmission and Distribution Committee, Jung Hotel, New Orleans, La., Sept. 29-30, 1955.

Florida Association of Electrical Contractors, Annual Convention and Exhibits, George Washington Hotel, Jacksonville, Fla., Sept. 30 - Oct. 2, 1955.

American Institute of Electrical Engineers, Fall General Meeting, Morrison Hotel, Chicago, Ill., Oct. 1-5, 1955.

Southern Section, IAEI, Annual Meeting, Jung Hotel, New Orleans, La., Oct. 3-5, 1955.

Oklahoma Utilities Association, Electric Light and Power Division, Eastern—Okmulgee, Okla., Oct. 13, 1955. Western — Norman, Okla., Oct. 14, 1955.

Edison Electric Institute, Electrical Equipment Committee, Shoreham Hotel, Washington, D. C., Oct. 17-18, 1955.

Southeastern Electric Exchange, Accounting Conference, Hotel San Carlos, Pensacola, Fla., Oct. 20-21, 1955.

Southeastern Electric Exchange, Sales Conference, Biltmore Hotel, Atlanta, Ga., Oct. 27-28, 1955.

National Electrical Contractors Association, Annual Convention, Waldorf-Astoria Hotel, New York, N Y., Nov. 2-5, 1955.

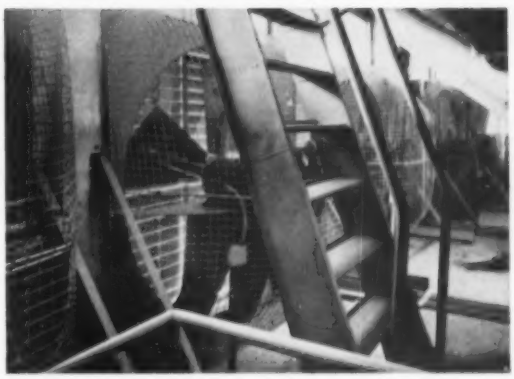
SEE WHAT THEY'RE DOING with "BUFFALO" PROPELLER FANS!

Fourteen 72" NV Belt-Airs ventilate huge new Livestock Coliseum at Montgomery, Ala., exhausting at the rate of 770,000 cfm requiring only 42 horsepower.

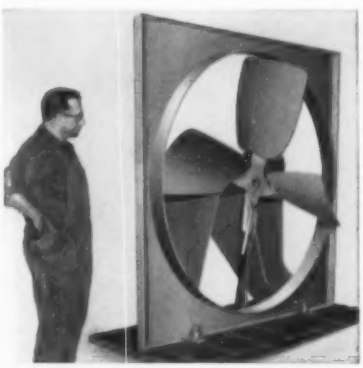
Architects and Engineers:
Sherlock, Smith & Adams
Montgomery, Alabama

General Contractor:
Butler & Cobbs
Montgomery, Alabama

Heating and Ventilating Contr.:
McKenney's, Inc.
East Point, Ga.



One bank of Belt-Airs in Coliseum. Furnished with motor-operated shutters and drive side guards.



Discharge side of 72" Belt-Air showing broad, curved blades for high efficiency at slow speeds and low noise level. Gusseted motor and bearing supports can be seen on drive side. Blades die-stamped and panel assemblies one-piece welded construction for rigidity and strength.

More and more big ventilation jobs like this Coliseum are being handled by "Buffalo" Package Propeller Fans. Users and contractors like the idea of the first cost and installation savings of propeller fans—plus the fact that this improved and enlarged "Buffalo" line gives the quiet, efficient performance so necessary to satisfactory air moving. These husky packages are now cooling large boiler rooms—exhausting fumes—moving air against as much as 1" static pressure. And you can select fan sizes all the way from 8" to 144" (the 12-foot size rated at 250,000 cfm!) *Request your copy of Bulletin FM-1234* on your company letterhead and see the jobs these fans with the "Buffalo" "Q" Factor* could be doing for you.

**The "Q" Factor — the built-in Quality which provides trouble-free satisfaction and long life.*

"Buffalo"

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210 MORTIMER ST. BUFFALO, N. Y.
PUBLISHERS OF "FAN ENGINEERING" HANDBOOK
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.
Sales Representatives in all Principal Cities

INDUSTRIAL EXHAUSTERS BELTED VENT SETS PROPELLER FANS "E" BLOWERS-EXHAUSTERS

the company of public warehousing space. At the same time, it makes for better, faster service to customers.

An unusual part of the new facility is the ramp connecting the warehouse and main plant. A turntable bridge that forms part of the ramp pivots to permit freight cars to pass on the tracks beneath.

The warehouse, which measures 400 feet by 250 feet is on one level and is designed to permit eventual conversion to manufacturing operations.

Thomas Industries picks Louisville as home base

THOMAS INDUSTRIES, INC., producer of residential lighting fixtures, power saws and paint-spraying equipment, is establishing its general and administrative offices in Louisville, Ky.

Lee B. Thomas, president, said a careful study of possible locations in all parts of the country led to the choice of Louisville. With plants in Kentucky, Wisconsin and California and products distributed nationally, the need to centralize top-level operation in one city had become increasingly necessary, he declared.

In addition to a plant in Princeton, Ky., the company also has another plant under construction in Hopkinsville, Ky.

Other Thomas Industries' plants are located in Fort Atkinson, Wis.; Sheboygan, Wis., and Los Angeles, Calif. The company's products are sold under the brand names of Moe Light, Star Light, Wright Power Saw, and Electric Sprayit.

The Louisville offices will house executive and administrative personnel, the national sales force, the merchandising division.

Among the key executives who will headquarter in the Kentucky city are:

R. D. Burns, Sr., executive vice-president; Frederick Keller, director of sales; R. W. Minett, Jr., vice-president; Kim Moe, vice-president; William L. Tierney, vice-president; F. C. Doyle, treasurer; J. L. Parentice, general sales manager of the Wright Power Saw Division and the Electric Sprayit Division; T. R. Fuller, sales manager of the Moe Light and Star Light Divisions, and Leonard V. Martikonis, advertising manager.

Thomas Industries' Moe Light and Star Light Divisions manufacture a complete line of residential lighting fixtures, sold nationally through a network of 650 distributors located in all key markets. The Electric Sprayit Division manufactures a full line of portable paint-spraying equipment, aimed at the do-it-yourself market and for use commercially by painting contractors. The main item of the Wright Power Saw Division is a gasoline-operated saw incorporating a reciprocating blade.

Executives of Thomas Industries, Inc., are pictured during a recent luncheon sponsored by the Louisville, Ky., Chamber of Commerce at which key management personnel of the firm were officially welcomed to the Kentucky city. Left to right are Franklin J. Lunding, member of the board of directors; Lee B. Thomas, president and chairman of the board; and W. J. Grede, member of the board of directors.

General Cable to acquire General Insulated Wire

GENERAL CABLE CORP., New York, N. Y., leading manufacturer of electrical and communications wire and cable, has entered into a contract for the acquisition of General Insulated Wire Works, Inc., Providence, R. I., according

J. R. MacDonald

to an announcement by I. T. Bennett, chairman of the board, and J. R. MacDonald, president of General Cable.

With the acquisition of this additional plant, General Cable will add a new line of products to include rubber, neoprene and plastic power supply cords with molded-on rubber or plastic attachment plugs and devices, electrical cord sets, bulk lamp cords, and portable power cords.

G. J. Craig, president of General Insulated Wire Works, will be appointed a vice-president of General Cable, with principal responsibility for the Providence operation.

The newly acquired plant occupies approximately 100,000 square feet and employs some 300 people. The plant has a weekly capacity of several million feet each of single conductor rubber jacketed and braided types of wire and an equivalent amount of plastic single conductor feet, and can produce millions of rubber and plastic molded terminal parts.

General Cable now operates six plants, located at Bayonne and Perth Amboy, N. J.; Rome, N. Y.; St. Louis, Mo.; Los Angeles and Emeryville, Calif.

Expansion program announced by A-C

A MULTI-MILLION dollar transformer and circuit breaker manufacturing expansion program at

Allis - Chalmers Manufacturing Company's Gadsden, Ala., and Terre Haute, Ind., plants was announced recently by J. W. McMullen, vice-president, transformer and switchgear equipment.

Large high voltage power transformers and high voltage heavy current circuit breakers will be manufactured at the Terre Haute works, and distribution transformers at the Gadsden works.

Mr. McMullen said that plans were now being made for the erection of a new 114,000-square foot building at Terre Haute. The new facilities are expected to be in operation in 18 months.

He said the manufacturer of distribution transformers would begin late this year at Gadsden, and explained that the utilization of the Alabama plant would give Allis-Chalmers an electrical manufacturing facility in the South where great electrical expansion is taking place.

Tork Clock names two to executive positions

CYRIL J. WHITE, president of Tork Clock Co., Inc., Mount Vernon, N. Y., has announced two promotions as voted on by the board of directors at a recent meeting.

Henry F. Zuba, who joined Tork in 1941, has been named a vice-president. Mr. Zuba, who is well known to electrical contractors, has served as design and sales engineer and has made important contributions in the development of new products. Patent applications, under Mr. Zuba's name, have been submitted for the Zubastat and Tork's 24-hour combination dial, the Switchmaster.

The board also named Dorset J. White as director of sales. Dorset, son of Cyril J. White, joined the company in 1954, after European service with the Armed forces. The younger White first served in various departments of the plant to gain a thorough basic knowledge of all phases of production, shipping, and sales.

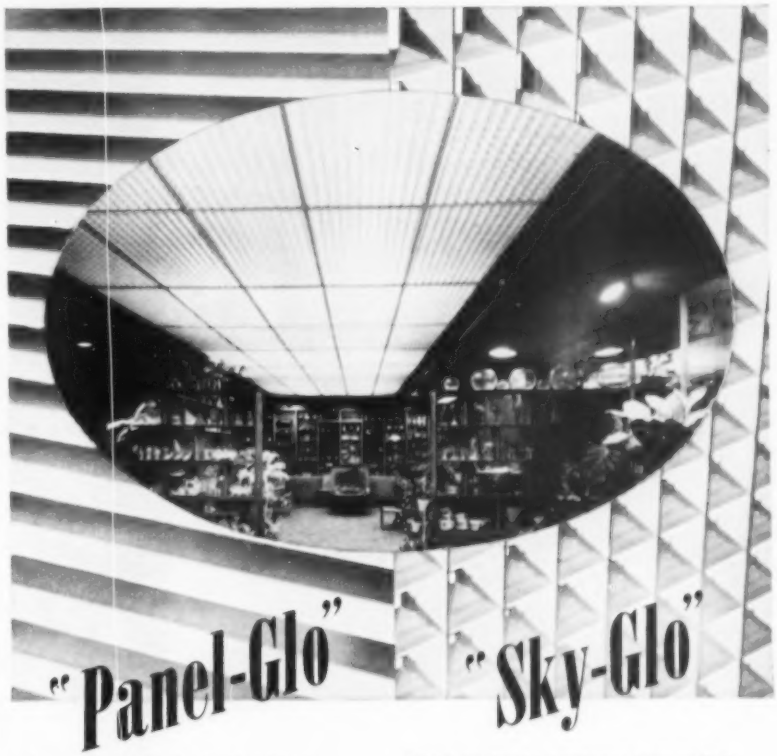
Circle F building new plastics factory

GROUND BREAKING ceremonies were held recently by officials of the Circle F Manufacturing Co., Trenton, N. J., for the firm's new Plastics Division factory.

According to an announcement by Edward A. Ring, vice-president of Circle F, and president of Eastern Insulated Wire Corp., Wallingford, Conn., this new factory, which will be located at Meade

the most inexpensive single thing you can do...

to create a MODERN ATMOSPHERE in any store!



lowest-cost Benjamin Luminous-Panel Ceiling. Made of translucent, white molded vinylite, which is odorless, distortion and shrink-proof. Has invisible ducts to facilitate air circulation.

finest Benjamin Luminous Louver Ceiling. Made of translucent vinylite "egg-crate" type louver panels, chemically welded at joints. Provides 45° shielding against lamp glare for greater eye comfort.

SIMPLIFICATION LIKE THIS brings you Benjamin Luminous Ceilings at a LOWER INSTALLED PRICE!

STANDARDIZED CONSTRUCTION— one easy-to-handle 3' x 3' size for louvers and panels.

EASIER, FASTER INSTALLATION— plastic material can be trimmed on the job.

NO EXTRAS TO BUY— finishing strips furnished for a neat, white trim.

SIMPLER TO ORDER . . . BUY IT BY THE SQUARE FOOT! Just know room dimensions and type of ceiling!

Benjamin "Sky-Glo" and "Panel-Glo" translucent ceilings offer the most inexpensive way to create the modern store look that makes people want to come in and buy. You get high levels of light that display merchandise to best advantage . . . at the same time you can modernize an ugly ceiling laced with fixtures and pipes into a magnificent "ceiling of light" without additional renovation! Shown at left are some of the reasons why "Sky-Glo" and "Panel-Glo" ceilings are the most inexpensive way to modernize . . . **FREE BULLETIN AD 6222** brings you further details. Write Benjamin Electric Mfg. Co., Dept. Z-1, Des Plaines, Ill.

BENJAMIN TRADE MARK
Luminous Ceilings

Sold Exclusively through Electrical Distributors

876

and Price Streets in Trenton, will house the complete molded plastic division of the company. The new building will provide an additional 40,000 feet of manufacturing space for plastic molding.

Several months ago, Circle F announced the purchase of Eastern Insulated Wire. This new building, to be completed by early September, marks the second major expansion this year of Circle F, which started business 51 years ago in a small shed.

"It is all part of the program," reported Mr. Ring, "to make Circle F a one stop for complete wiring needs."

Southern sales manager appointed by Kuhlman

JAY G. GATES has been appointed Southern sales manager for the Transformer Division of Kuhlman Electric Co., Bay City, Mich.

Mr. Gates will be regional sales manager in 11 Southern states: North Carolina, South Carolina, Georgia, Florida, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma, and Texas, with the exception of the El Paso area. He will co-ordinate relations between customers, sales personnel, and the Kuhlman factory located at Crystal Springs, Miss. He will also act as liaison between the company's Southern activities and the Bay City headquarters.

Gulf Sales appointed Standard sales agent

GULF SALES AGENCY has been appointed as exclusive sales agent for the Standard Transformer Co., Warren, Ohio, in the States of Louisiana, Mississippi, Arkansas, and Western Tennessee.

Gulf maintains sales offices at 500 Magazine St., New Orleans, La.; 731 Wingfield St., Jackson, Miss.; and 6708 Kenwood Rd., Little Rock, Ark.

Gulf will handle Standard's complete line of distribution, power, current, potential, and metering transformers.

Charleston distributor moves into new quarters

ANNOUNCEMENT has been made by officials of Levison Electric Supply Co., electrical distributors, that their firm is now located in its new quarters at 731 Meeting St., Charleston, S. C. The firm's new phone number is 3-2592.

MODERN DISPLAY—Staff members of W & W Distributing Co., 644-646 Madison Ave , Memphis, Tenn., are shown in the firm's new modern quarters, which features attractive island displays of lines handled. W & W boasts one of the largest stocks of industrial electronic equipment in the South, all housed under one roof in the firm's 15,000 square foot plant.

Ender-Monarch names Maryland-D. C. agent

NATHAN MILLER, president of the Ender-Monarch Corp., Westbury, L. I., N. Y., has announced the appointment of Charles Poey, 144-84 41st Ave., Flushing, N. Y., as their agent in the States of Maryland and Pennsylvania, and the District of Columbia, for the Ender-Monarch product line.

Pittsburgh Reflector forms new division

PITTSBURGH REFLECTOR CO., Pittsburgh, Pa., has announced the formation of a new division to manufacture Luma-Ceiling and church lighting equipment exclusively. Eric D. Altree has been named to head this newly established division, and Harold D. Siler has been named to succeed Mr. Altree as manager of the firm's Engineering Department.

Mr. Altree has been with Pittsburgh Reflector for the past nine years as manager of the Engineering Department. Previously he was with General Electric for 22 years as an illuminating engineer.

Mr. Siler has been with Pittsburgh Reflector for the past 15 years. He was district engineer, then manager of the New York office, and was later transferred to Pittsburgh to take charge of purchasing and expediting. He joined the Pittsburgh sales staff in 1946.

E. D. Altree

H. D. Siler

News about people

Election of **Robert W. Minett, Jr.**, Fort Atkinson, Wis., as president of the **American Home Lighting Institute**, Chicago, was announced recently by the Institute.

Mr. Minett is vice-president in charge of merchandising for Thomas

R. W. Minett, Jr.

Industries, Inc., which operates the Moe Light Division, Fort Atkinson.

The American Home Lighting Institute is a trade association of leading home light fixture manufacturers formed to disseminate information about home fixture lighting and develop new ideas and applications in this field.

Hershel Apple, Jr., office manager of **Duck River Electric Membership Corp.**, and acting manager of that organization since the death of its late manager, **F. J. Wallheiser**, was appointed manager by the co-op board of trustees at a recent meeting in Shelbyville, Tenn.

Mr. Apple has been associated with Duck River Electric since September, 1954. Prior to this he was plant accountant for six years of the Upper Cumberland Electric Membership Corp., Carthage, Tenn.

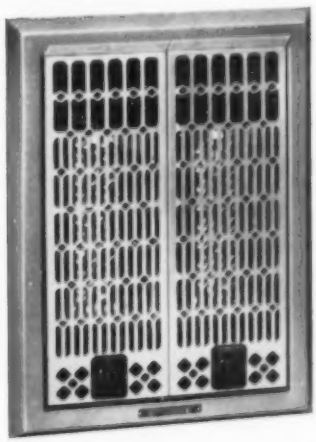
Mr. Wallheiser succumbed to a heart attack recently after a brief illness. He had served as manager of Duck River EMC since 1941 and directed that organization through a program of expansion to place it among one of the largest electric co-operatives in the U. S.

Duck River Electric provides electric service to nearly 21,000 members in its operating area in Middle Tennessee.

L. M. Smith, president of Alabama Power Co., was elected a director of **Edison Electric Institute** at its recent annual meeting. Mr. Smith, Birmingham's "Man of the Year," only recently was appointed chair-

FLOOR MODEL
3 sizes —
230 volt AC with "Adjust-o-matic" thermostatic control. Streamlined design fits in any room.

SELL THE DESIGNS SPECIFIED BY SURVEY

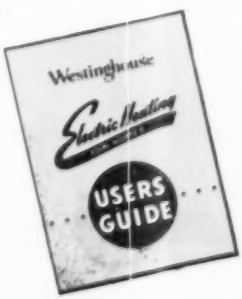


WALL MODEL
9 sizes —
230 volt AC with "Adjust-o-matic" control. 3KW size fits into standard stud spacing.

First a national survey was conducted to determine the true heating needs of today's home-owner. Then Westinghouse built the units that best served those needs. Now you can sell electric heating designed for modern living.

Westinghouse offers your customers clean, safe, economical heat — automatically regulated room by room at the flip of a switch. And you can answer every individual housing requirement with smartly styled floor and wall models in all types and sizes that install in minutes, last for years — the **only** heaters that won't discolor or change their heat constancy.

YOU CAN BE *SURE*... IF IT'S Westinghouse



Send for this proven sales aid today.
WESTINGHOUSE ELECTRIC CORPORATION
1299 Northside Dr., N.E.
Atlanta 13, Georgia

Please send me without charge_____copies of your Users Guide which explains the advantages of Electric Heating.

NAME_____

ADDRESS_____

CITY_____STATE_____

IF IT RUSTS... IT'S NOT A

KILLARK

ELECTROLET

ALL KILLARK FITTINGS ARE

- Non-Rusting
- Non-Corroding
- Lightweight
- Smooth
- Durable

MADE OF LONG LASTING ALUMINUM ALLOY

CONTACT YOUR KILLARK WHOLESALER

Atlanta—69 Mills St., N. W.
Dallas—1903 Griffin St.
Baltimore—11 W. 25th St.

FREE
KILLARK
CONDENSED CATALOG

Killark
KILLARK ST. LOUIS
ELECTRIC MANUFACTURING COMPANY
VANDEVENTER AND EASTON • ST. LOUIS 12, MISSOURI

ENTRANCE FITTINGS • CONDUIT BODIES • FLUSH SWITCH FITTINGS
EXPLOSION PROOF FITTINGS • VAPOR TIGHT LIGHT FIXTURES
EXPLOSION PROOF LIGHT FIXTURES • SEALED BEAM FIXTURES

man of the Committee on Commercial Uses of Atomic Energy of the United States Chamber of Commerce. He is beginning his second year as a member of the board of directors of the U. S. Chamber.

Graybar's President, **W. E. Henges,** has announced the appointment of district credit managers at Houston and St. Louis.

W. E. Brown has been transferred to Houston as district credit manager. Mr. Brown started with Graybar as a student in Chicago's Credit Department in March, 1947. After serving as creditman at Chicago from 1948 to 1952, he was appointed credit manager at Milwaukee. He has been district credit manager at Minneapolis from May, 1953 until receiving his new appointment.

Effective August 1st, **W. R. Pearson** will become district credit manager at St. Louis, succeeding **H. E. Bucher** who will retire. Mr. Pearson joined Graybar in Kansas City as a student in February, 1940. The following year he was made creditman and teller and, in 1945, he became a procurement expeditor, returning to creditman in 1947. He became credit manager at Denver in 1950, transferring to Houston in 1951 as district credit manager, which position he held until receiving his new appointment.

David L. McCausey, Jr., Thomas E. Blackwelder and **Robert D. James** have been assigned as sales representatives to the Tulsa, Jacksonville and New Orleans offices, respectively, of **Allis-Chalmers General Machinery Division.**

McCausey is an electrical engineering graduate of Texas A. & M., Blackwelder a mechanical engineering graduate of North Carolina State College, and James a civil engineering graduate of North Carolina State.

Announcement is also made of the appointment of **Gene Melton** as a field serviceman in the company's midwest region with headquarters in St. Louis. Melton is a mechanical engineering graduate of the University of Texas.

All of the men recently completed Allis-Chalmers training course for graduate engineers.

Miles Cary, former operating manager of the **Virginia Electric and Power Co.,** has been elected vice-president in chage of operations, according to an announcement by Vepco President Jack G. Holtzclaw. He will have general supervision of all electric and gas operations throughout the company's system.

Mr. Cary became associated with Vepco in 1926, and after a brief assignment in Norfolk, was transferred to Richmond, where he served as efficiency engineer and plant en-

gineer at the Twelfth Street power station. He was appointed superintendent of system operation in 1932, a position he held until being named manager of system operation in 1944. Mr. Cary was appointed operating manager of the company last September.

R. P. Wagner has been appointed manager of the distribution equipment group of the **Westinghouse Transformer Division's Sales Department,** Sharon, Pa.

At the same time, **J. W. Harrell** was named manager of the newly-created regulator and network transformer section of power equipment sales for the division.

Mr. Wagner joined Westinghouse in 1942 in the advertising department, where he held various positions including that of manager of the department.

Mr. Harrell graduated from Kansas State College in 1939 with a degree in Electrical Engineering, at which time he joined Westinghouse.

Lewis M. Smith, president, **Alabama Power Co.,** Birmingham, Ala., has been named chairman of the committee on commercial uses of atomic energy of the Chamber of Commerce of the United States for the year 1955-56, according to announcement by **A. Boyd Campbell,** Chamber president. Mr. Smith is a member of the national chamber's board of directors.

The committee's primary function is to encourage development and use of atomic energy by private enterprise. During the 1955-56 year, in addition to an educational program on uses of the atom, the committee will focus attention on any needed legislative changes and regulatory improvements in this field.

Free bulletins

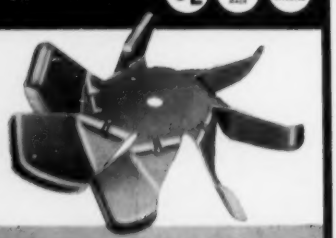
The Electric Heating Division, **Cavalier Corp.,** Chattanooga 2, Tenn., has available a colorful catalog containing complete information on their line of **electric heating equipment.** The Cavalier line includes wall insert heaters, baseboard heaters, surface mounted heaters, heavy duty portable heaters, bathroom heaters, and floor furnaces.

For your free copy, circle number B836 *on the coupon on page* 107.

Interested electrical contractors and electrical wholesalers can secure complete information on the Jackson line of **automatic electric floor furnaces** from the **W L. Jackson Manufacturing Co.,** 1222 East 40th

No other like it
TRADE ARRO MARK
This Trademark shows that you have the finest in drilling and anchoring devices when you use ARRO.
Always Specify ARRO
ARROFLUTE CARBIDE MASONRY DRILL
LAG SCREW EXPANSION SHIELD
A-C-E EXPANSION SHIELD
DOUBLE EXPANSION SHIELD
O-E EXPANSION SHIELD
MACHINE SCREW ANCHOR
STUD BOLT ANCHOR
LEAD SCREW ANCHOR
MAL LEAD BOLT ANCHOR
TWO WING SPRING-TYPE TOGGLE BOLT
SPRING HEAD STEEL TOGGLE BOLT
RIVETED HEAD TOGGLE BOLT
LITTLE MAJOR TURNBUCKLE
FOUR-POINT HAND STAR DRILL
THREE-POINT DRILL POINT
FOUR-POINT DRILL POINT
TWIST DRILL POINT
RUBBERGRIP DRILL POINT HOLDER
See your industrial, hardware or electrical supplier
ARRO EXPANSION BOLT COMPANY
1520 Boone Ave., Marion, Ohio

From Melbourne to Manhattan you can bank on Blo-Fan nationally advertised features—like the exclusive Pryne design blade—for extra sales appeal! Count, too, on labor saving installation and built-to-last construction that ends profit-cutting callbacks!



ONLY *Blo-Fan* HAS THIS BLADE!

MODEL 210

Scoops up smoke and odors. Redirects discharge thru horizontal duct in continuous stream! Eliminates "backwash bottleneck."

Ordinary "propeller" action

Blo-Fan "blower" action

pryne

PRYNE & CO., INC. ESBB
KEYSER, WEST VIRGINIA

Please send more information about the Pryne Blo-Fan.

Name_____

Company_____

Street_____

City_____ Zone____ State_____

St., Chattanooga 7, Tenn. The Jackson automatic electric floor furnaces come in three sizes to take care of the heating requirements of almost any size home.

For your free copy, circle number B837 *on the coupon on page* 107.

A new catalog sheet giving complete information on their new **1500 watt electric radiant glass heating units** is available from **Berko Electric Manufacturing Corp.**, 212-40 Jamaica Ave., Queens Village 28, N. Y.

For your free copy, circle number B838 *on the coupon on page* 107.

A full-color brochure showing their line of Aireryte **automatic electric room conditioners** is available for the asking from **Nesco**, Milwaukee 1, Wis. The Nesco line includes three portable models and one wall unit. All are 1650 watts, 110-120 volts.

For your free copy, circle number B839 *on the coupon on page* 107.

Superior Electric Products Corp., Cape Girardeau, Mo., manufacturers of the Sweet Sue Super Lectric line of **space heaters**, has available a catalog sheet giving complete information on both their No. 99 Reflector Heater and their No. 600 Fan Heater.

For your free copy, circle number B840 *on the coupon on page* 107.

A folder containing catalog sheets with complete information on their line of Circle Air standard, baseboard, and portable **electric convection heaters** is available from **Circle Air Industries, Inc.**, 244 Herkimer St., Brooklyn 16, N. Y. The folder includes photographs of typical Circle Air installations.

For your free copy, circle number B841 *on the coupon on page* 107.

A copy of their Bulletin Form 401 is available from **Electrend Products Corp.**, St. Joseph, Mich. The illustrated bulletin gives complete specifications and installation information on the Electrend **electric heating system.**

For your free copy, circle number B842 *on the coupon on page* 107.

An **engineering instructions data booklet** with heat loss calculations for their line of radiant electric glass heaters is offered by **Can Arm Corp.**, P. O. Box 30, Chazy, N. Y. The booklet includes specifications and complete information on the Can Arm line of radiant glass heaters—surface, recessed, bathroom, baseboard, and portable models.

For your free copy, circle number B843 *on the coupon on page* 107.

Catalog 17, a beautiful 32-page volume, in full color, is announced by **Imperial Lighting Products Co.**, Loyalhanna Park, Latrobe, Pa. The catalog features an illustrated index and shows Imperial's complete line of Imperialites for **contemporary home lighting.**

For your free copy, circle number B844 *on the coupon on page* 107.

Complete information on their **built-in type electric Quikheter**, available with built-in control switch or built-in thermostat, is available from **Frank Adam Electric Co.**, 3650 Windsor Place, St. Louis 13, Mo. This information is contained in the eight-page, two-color, Frank Adam Bulletin No. 1103.

For your free copy, circle number B845 *on the coupon on page* 107.

A colorful brochure presents complete information on two new comfort control appliances—**fan forced heaters** Model MP 205TC and Model MP 202. These units are manufactured by **Mimar Products, Inc.**, 138 Spencer St, Brooklyn 5, N. Y. The brochure also contains prices and information on other units in the Mimar fan heater line.

For your free copy, circle number B846 *on the coupon on page* 107.

A copy of their booklet, **"Design for Modern Electric Heating,"** is available from **Wesix Electric Heater Co.**, 390 First St., San Francisco 5, Calif. This booklet should prove to be a handy sales tool for electrical contractors in selling electric heating installations.

For your free copy, circle number B847 *on the coupon on page* 107.

Heatmore, Inc., 59 Throop Ave., Brooklyn 6, N. Y., has available a colorful brochure showing their complete line of electric heating equipment. The Heatmore line features **Radiant Ceramic heating** and includes wall mounted panels, baseboard panels, and portable units.

For your free copy, circle number B848 *on the coupon on page* 107.

"Electric Heating for Homes" is the title of a catalog available from **Westinghouse Electric Corp.**, Sunnyvale Plant, Sunnyvale, Calif. The catalog contains complete information—descriptive bulletins and in-

it's a

JAY

Recommended for September Selling

J560 (Bottom) 6 Lts. Width: 20" Adjustable Pulley. Finish: Black & Brass, White & Brass or Pink & Brass. Clear Sparkling Balls on Wire End. Candelabra Sockets.

J546 (Left) 6 Lts. Width: 24½", Length: 43". Finish: Black & Brass or White & Brass. Swedish Blonde Wood Perforated Matching Shades.

J570 (Top) 5 Lts. Width: 20½", Length: 35". Finish: Black & Brass. Glass: Ceramic Fibre-Glaze.

JAY LIGHTING MFG. CO., INC.

25 QUINCY ST., BROOKLYN 38, N. Y.

SELL THE "OLD RELIABLE"

sell . . .

Massey HEAVY DUTY

..WALL PLATES

Bakelite or Metal— it's the complete line!

Since 1936 Massey popularity has been built upon a "quality" basis. You sell more Massey plates — You enjoy more profits.

- **Lower in COST • 25% heavier**
- **Uniform • Easier to match-up**
- **Comply with Fed. W-R, 151a and REA Specifications.**

SINGLE AND MULTI-GANG WALL PLATES AND ELECTRIC WIRING DEVICES

Send for catalog and prices today

A. H. MASSEY, INC.

P. O. BOX 206
DERBY, CONN.

Established since 1936

ELECTROMODE

WORLD'S MOST COMPLETE LINE ALL-ELECTRIC HEATERS

ELECTRIC HEATING SYSTEMS

100% SAFE

Only ELECTROMODE has the sealed-in CAST-ALUMINUM HEATING ELEMENT. No danger of fire, shock or burn. Guaranteed for 5 years. Built-in safety switch prevents overheating.
Approved by Underwriters' Laboratories.

For More Than a Quarter Century Electromode Has Specialized In One Specific Industry

HEATING BY ELECTRICITY

BASEBOARD HEATER

LOW LEVEL PERIMETER HEAT

Basic Unit: 32" long, 8½" high, 3" wide. 600 watts, 120 or 240 volts. Blank sections, endpieces and corners available so that a completely harmonious, unbroken baseboard effect may be carried out in any size room. Separate thermostat for each room.

WALL-TYPE HEATERS

- Capacities for All Size Rooms
- Fan-Circulated Heat
- Modern Designs
- Fast, Easy To Install
- Automatic Control
- Satisfied Users

For BIG Rooms
MODEL WA

Distributes Heat by Down-Flo Principle. Silver Grey Hammertone Finish

For BATHROOMS
MODEL WJA

Choice of Chrome or White Enamel Finish

RADIANT PANEL HEATER
MODEL RC-11A

Combines principles of radiant and convection heating. No glass or ceramics to break. Silver grey hammertone finish.

CEILING RADIANT CABLE HEAT

Electromode Heating Cable installed in ceiling radiates clean, sunlike heat downward. Has Magic Seal coating which prevents streaks on ceiling when cable is embedded in plaster. Automatic temperature control by separate thermostat for each room.

Diagram showing sectional view of cable before plastering illustrates how Electromode Ceiling Radiant Heat warms floors and everything in room.

ELECTROMODE CORPORATION, Dept. ES-85
45 CROUCH STREET, ROCHESTER 3, N. Y.

Please send free literature with specifications, illustrations, and how to figure and install Electromode Heaters and Heating Systems.

Name_____

Address_____

City_____ Zone____ State_____

stallation instructions—for Westinghouse's bathroom, wall, and floor model electric space heaters. It also includes prices and information on sales aids.

For your free copy, circle number B849 *on the coupon on page* 107.

A handy file folder of catalog sheets giving complete information on their line of **electric heating equipment** is available from **Electromode Corp.,** 45 Crouch St., Rochester 3, N. Y. The folder features illustrations and specifications on all Electromode units.

For your free copy, circle number B850 *on the coupon on page* 107.

A complete series of **Donut type current transformers** for metering applications is described and illustrated in a new four-page Bulletin 365-1, which is available from **Associated Research, Inc.,** 3758 W. Belmont Ave., Chicago 18, Ill. The transformers are available in both the ring type for mounting over wire and cable and the rectangular window type for mounting over bus bars. Complete specifications on dimensions and accuracy are given.

For your free copy, circle number B851 *on the coupon on page* 107.

Technical books

for the electrical man

Electric Heating Guide

Westinghouse Electric Corp., 401 Liberty Ave., Box 2278, Pittsburgh 30, Pa., 32 pages, $2.00.

This revised edition, a comprehensive handbook on electric heating, contains the latest information on designing, cost estimating, and installing electric heating systems.

This new edition includes a concise review of heating fundamentals and an expanded section discussing all factors involved in cost estimating.

The useful charts for determining heating capacity in a specific room have been brought up-to-date and enlarged. Covering a variety of construction conditions (such as location and thickness of insulation), the charts may be readily adapted to fit almost any set of conditions.

Other sections cover installation of heaters, planning adequate wiring and proper circuit protection, and weather data. Of particular interest is a case history showing step-by-step how to design a typical electric heating system using the principles given in the booklet.

Although the Guide carries a price of $2.00 per copy, it is normally furnished free of charge to those concerned with design and installation of electric heating systems.

For a copy of this booklet (B-3768-B), contact your nearest Westinghouse apparatus sales office.

Blue Book of Plumbing Design — Installation

Estimating Handbook Associates, De Kalb, Ill., 486 pages, $7.75.

This book affords one complete source for quick, reliable answers to all plumbing problems. It was written by a plumber for plumbers and is a logically arranged working tool that gives the latest, time tested, on-the-job shortcuts on all types of plumbing problems—including the greatest problem of all—estimating the cost of a job.

The book is practical and easy to understand, written by a plumbing contractor who has practiced his trade for over 20 years. Tested methods are explained in detail.

The estimating section of the book contains new type charts that simplify this essential part of the operation. All that is necessary to be known is the size of the pipe and nature of the job. With this information you merely refer to these charts and your answer is all worked out for you.

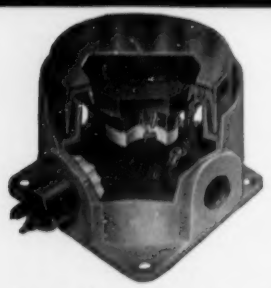
Heating Ventilating Air Conditioning Guide

American Society of Heating and Air-Conditioning Engineers, 62 Worth St., New York 13, N. Y., $12.00.

This 1955 33rd edition of the Guide contains the latest technical and equipment information, and is both larger and improved in content. The technical section is 1160 pages, and the equipment section includes technical data concerning

Latrobe PRODUCTS

FLOOR BOXES • WIRING SPECIALTIES



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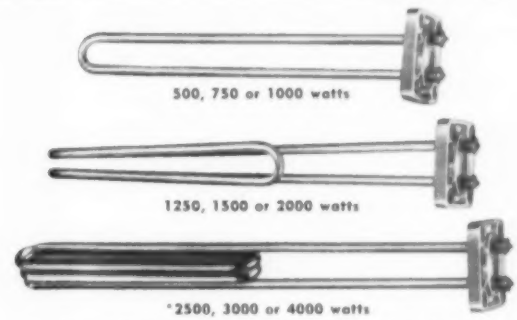
the products of 328 manufacturers.

The many revisions and expansions are the result of research by the Society and others, changes in codes and standards, new methods in product design, and improved engineering practices. However, despite the many improvements, the appearance and arrangements of the chapters is the same, and the 53 chapters are grouped as Fundamentals; Human Reactions; Heating and Cooling Loads; Combustion and Consumption of Fuels; Systems and Equipment; Special Systems; and Instruments and Codes. Also retained are the edge indexes in both the Technical and Catalog Data Sections, and classified subject and product indexes; and the 24 by 32 inch ASHAE Psychrometric Chart is still included.

The many changes include several rewritten chapters, a new chapter on schoolhouse heating and ventilating, new information of heating systems using high temperature hot water, and reorganized design information on thermal conductivities and conductances for pipe insulation and building materials. In addition, there are major revisions and changes in many of the chapters.



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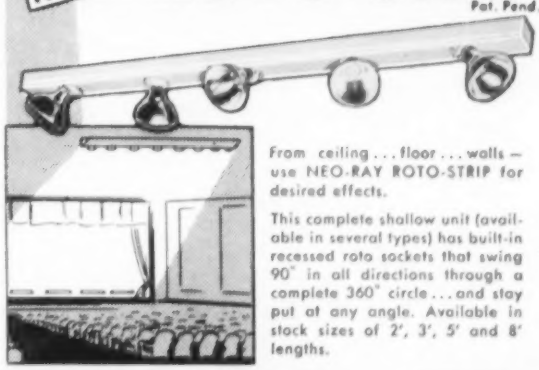

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Connecting and Testing Direct Current Machines

By F. A. Annett and A. C. Roe. Published by McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N. Y. Third edition. 328 pages, $5.

Modern methods for connecting direct-current motors and generators and for locating faults in their armatures and field windings are described in this book. The material is designed to give electrical engineers and maintenance and repair workers practical help for rebuilding d-c machines for higher ratings and longer operating life, and for testing for winding faults, under a wide variety of conditions. There are data on changing a series type into a shunt machine or vice versa, on converting a d-c generator into a motor and vice versa, figuring new windings on old d-c machines, and many other operations.

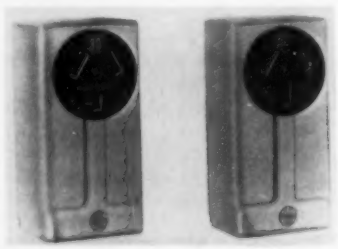
Featured is new material on testing armature windings and field coils, high-temperature insulations, increasing the capacity of old generators and motors, new insulation-testing devices, and techniques of high frequency, low-energy, surge-voltage testing.

New products

(For more information, use coupon on page 107)

Harvey Hubbell adds surface type outlet

A NEW SURFACE TYPE power outlet with metal cover has been introduced by Harvey Hubbell, Inc., Bridgeport, Conn. Available in both 30 amp and 50 amp ratings, these units are designed to meet UL requirements for a surface type outlet rugged enough to withstand the roughest usage in industrial or commercial applications. Both 30 and 50 amp units are finished in an attractive "Tumblast" aluminum to blend with all kitchen interiors.



An outstanding feature of the 50 amp outlet is the new Hubbell-designed swivel-nut assembly which contributes to a saving in installation time and trouble. When the screw is loosened, the captive terminal swings out of the way, providing an open channel for insertion of wire. Then, with wire in place, terminal assembly swings back into position and positive contact is made by tightening the screw.

The 30 amp outlet features the L-shaped slot which prevents interchange with 50 amp units. Conventional-type screw terminals are used in this device.

For additional data, circle item 852 on the coupon on page 107.

Gedney introduces water-tight fitting

GEDNEY ELECTRIC CO., RKO Bldg., Radio City, New York 20, N. Y., announces an important addition to the Gedney fittings line—a new and superior connector for Sealtite Conduit.

Designed to provide completely safe and dependable protection for wiring installations in this popular type of oil- and water-tight flexible raceway, the new connector is built for lifetime service. It consists of a locknut and main fitting, a brass grounding bushing, a molded Neoprene gasket, and a hex gland nut. Locknut, main fitting and gland nut are made of malleable iron and hot dip galvanized.

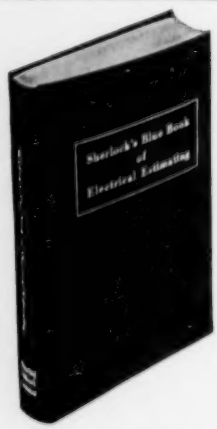
The new Gedney Connector for Sealtite Conduit is available in standard sizes from ½-inch to two inches.

For additional data, circle item 853 on the coupon on page 107.

High bay reflectors announced by Sylvania

A NEW LINE of porcelain enameled reflectors for high bay mercury vapor or incandescent lamp mounting has been announced by Sylvania Electric Products, Inc., Lighting Fixture Dept., Wheeling, W. Va.

The slotted-neck reflectors are especially designed for use in the illumination of high bay areas where light must be concentrated. The units are particularly adaptable to the lighting of foundries, machine shops, power plants, railroad shops and other applications where high



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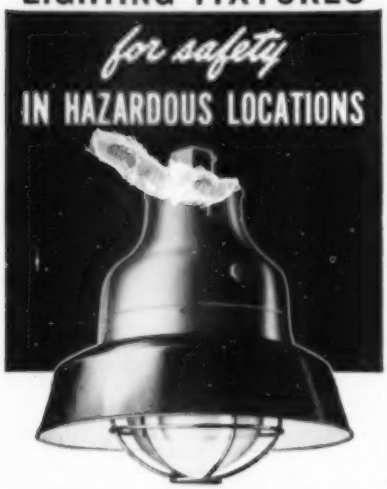

EXPLOSION PROOF

Pyle-National LE Series: Class I, C and D

For use in locations where highly flammable materials are manufactured or handled.

Rugged, flame-tight cast aluminum alloy housings render internal explosions harmless, and insure safe operating temperatures. Threaded construction permits easy access to interior for wiring and lamp replacement. Available in many types and sizes.

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Pyle-National DE Series: **Class II, Groups, E, F and G**

For use in locations where flammable dusts are present in quantity.

Strong, one-piece cast aluminum alloy housings are designed to exclude dust from the interior and to avoid accumulation of dust on the exterior surface. Available in many types and sizes.

Consult the new PYLET Catalog for complete line of explosion-proof supporting PYLETS for lighting fixture mounting.

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mounting heights are necessary.

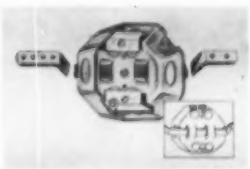
Pressed and drawn from steel, the lip edges of the reflectors are turned and rolled to provide adequate stiffening. They are finished with a white interior reflecting surface containing titanium dioxide. Slotted necks provide for constant natural air circulation, thereby minimizing deposits of soot and grime. Lamp life is increased through cooler operation.

Lamp fittings and neck sizes accommodate 1,000-watt incandescent lamps and 400-watt high or low-pressure mercury vapor lamps. A twin mounting bracket is available. For areas where excessive dust, smoke, or acid fumes prevail, glass covers are available. A heavy welded wire guard is offered for protection from damage by moving objects. Another important accessory available is a moisture shield, providing protection for the reflector type lamps.

For additional data, circle item 854 *on the coupon on page* 107.

Arrolet offers bar and box combination

THE ARROLET CORP., Montgomery, Pa., has devised a new bar and box combination which assures much easier and quicker installations wherever this particular box is used.



The bar is permanently attached to the box, passing through two extruded sections in the back. With this arrangement, there is no interference with the amount of free space or wiring capacity within the box.

This particular box is available with romex clamps and any type bar.

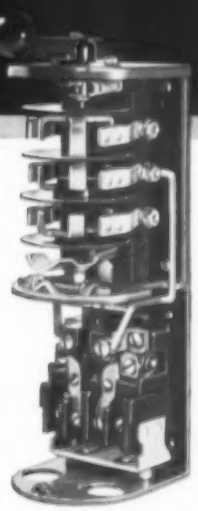
For additional data, circle item 855 *on the coupon on page* 107.

Slater Electric announces grounding-type receptacle

SLATER ELECTRIC and Manufacturing Co., Inc., Woodside, L. I., N. Y., has announced the addition to its present line of wiring devices of a single 20-amp grounding-type receptacle.

Compactly designed for extra wiring room in the outlet box, this new, rugged single grounding-type receptacle is rated 20 amperes, 250 volts. It can be used in single-phase with a separate ground and in three-phase wiring, or it can be used in

ENGINEERED for DOUBLE-DUTY!



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single-phase and grounded to the yoke. Special solid phosphor-bronze contacts are used for maximum performance.

There are two methods of wiring the S-395. The wire can be wrapped around the screw or it can be back-wired, incorporating the Slater "Channel-Lock" feature. Screws are staked out to ease wiring.

For additional data, circle item 856 on the coupon on page 107.

Anaconda introduces portable cord line

A COMPLETE LINE of portable cords for rugged applications has been announced by Anaconda Wire & Cable Co., 25 Broadway, New York 4, N. Y. It includes a new Securityflex cord, Industrial cord and Service cord.

The Securityflex cord is designed for unusually severe applications, where cords are exposed to the elements and subjected to abrasion, crushing, impact, shock, moisture, oils, grease and acids. It is especially adapted to industrial application.

For severe applications, the new Anaconda Industrial cord combines serviceability and economy. It resembles the Securityflex cord in all respects, except that the neoprene jacket is cured by continuous vulcanizing. The jacket is free stripping and can be used in automatic stripping machines.

The Service cord is designed for hard service use — where normal mechanical damage and dampness are encountered and exceptional flexibility is needed. Typical uses are on appliances, office equipment, portable tools, and trouble lights.

For additional data, circle item 857 on the coupon on page 107.

Anderson Brass designs custom stud connectors

ANDERSON BRASS WORKS, Birmingham, Ala., recently filled an order for custom stud connectors for use with large power transformers, designed to prevent later replacement due to re-conductoring.

This connector was designed by Anderson to meet the specified need

for connecting four conductors from 500 MCM to 2,000 MCM in a vertical or horizontal plane to a three-inch to 12-inch thread bushing stud.

The eight high-tensile eyebolt clamping members (two per cable) can be tightened on cables in a vertical take-off position or they can each be rotated 90 degrees to clamp horizontally. Four clamping bolts are provided in the base to give maximum electrical and mechanical efficiency.

For additional data, circle item 858 on the coupon on page 107.

G-E announces new feeder busway design

A NEW HIGH-REACTANCE feeder busway design permitting interrupting capacities of more than 100,000 amperes RMS symmetrical at transformer output terminals has been announced by General Electric's Distribution Assemblies Dept., Plainville, Conn.

Known as the Type CL, this new factory assembled busway is designed for use in commercial and industrial buildings for connection between the service entrance and the main switchboard, or wherever it is desired to reduce the available short-circuit current.

The new design provides values of reactance which are from eight to 23 times that of conventional feeder busways. One ten-foot section of the new Type CL busway offers more reactance than a 200-foot run of busway of standard design in the same rating, it is claimed.

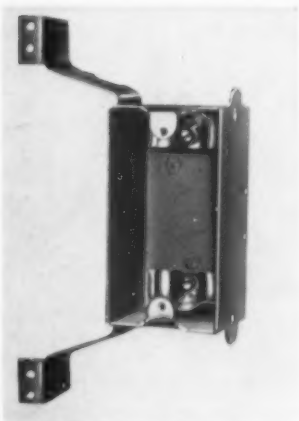
According to G-E engineers, the new busway serves the same function as a current-limiting reactor by appreciably reducing the magnitude of short-circuit current available at its output end.

For additional data, circle item 859 on the coupon on page 107.

Keystone boxes feature twin mounting brackets

A NEW SWITCH BOX featuring twin mounting brackets which permit faster, easier installation on structural members and studding has been added to the line of wiring devices produced by Keystone Manufacturing Co., 23328 Sherwood Rd., Center Line, Mich.

Designed for use with non-metallic sheathed cable and flexible tubing, the boxes' twin brackets eliminate the need for auxiliary mounting devices. In addition, the 4 x 2 x 2-inch box provides 16 cubic inch capacity, thus giving more conductor space than conventional switch boxes, according to the manufacturer.



Two 21/32-inch pri-outs are provided on three sides of the heavy gauge steel box and one knockout for ½-inch conduit is located in the bottom. Clamps with nested fit are also provided to facilitate the pulling of wires, thus reducing installation time and labor costs.

For additional data, circle item 860 on the coupon on page 107.

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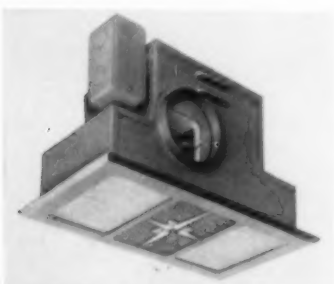
FORE MORE INFORMATION — Use this handy return coupon for requesting manufacturers bulletins or additional information on new products listed in these pages. Be sure to give firm name and your position or title.

Ceiling light-ventilator introduced by Trade-Wind

A NEW CEILING LIGHT and ventilator combination unit for use in either inside or outside bathrooms has been announced by Trade-Wind Motorfans, Inc., 7755 Paramount Blvd., Rivera, Calif.

The new unit incorporates two 75 watt lamps located on either side of a single wheel blower unit which exhausts 100 cfm. The blower assures complete ventilation, eliminating steam, lingering dampness and odors.

The entire unit is mounted flush in the ceiling. Translucent ribbed glass conceals the two light housings and expanded metal with a decorative design in bright chrome conceals the blower unit. The entire grille is held in place by a single thumb turn for ease of cleaning and lamp replacement.



Simple installation is one of the features of the new light-ventilator combination. The unit, which measures 13⅞ inches wide x 7 3/16 inches deep x eight inches high overall, installs between joist spaces in the ceiling and is completely prewired to an external junction box, eliminating the need for running asbestos leads. The new model can be wired to a single switch or three wires run to a double switch. The Trade-Wind Time-Delay Switch also can be used with this unit.

For additional data, circle item 861 on the coupon above.

man of extinction

Oh, he was quite the guy in his day—we're not denying that. In his Stutz Bearcat, with his high collar and spats, he was looked at—and up to—from all quarters. He went to all the right places — swam in knee-length tights, wore goggles out motoring, kept his appointments with a watch the size of your grandmother's fattest biscuits.

But he's not with us any more. Neither are his spats or cane or goggles. All we have to remember him by are some of the devices he used to keep warm (pictured above). You see them still, though they're fading fast. Today's man of discrimination doesn't prop his feet on the nearest pot-bellied stove; his heating comes from glass panels—clean heat, properly humidified, perfectly regulated.

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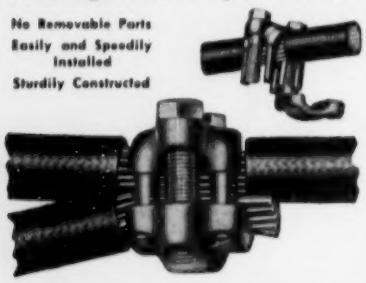

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McGill lamp guards provide 3-wire outlets

QUICK, SAFE GROUNDING of power tools in garages, shops and other working areas is provided by the approved 3-wire convenience outlet in a series of portable lamp guards made by McGill Manufacturing Co., Inc., Valparaiso, Ind.

The grounding system, which has been used for some time by McGill, recently has been adopted by NEMA. In this system the convenience outlet is designed to receive plugs having two parallel heads and U-shaped third blade for ground.

The cage is grounded by means of internal handle construction with a third terminal providing contact with the attached cord. With the convenience outlet in the handle, it's possible to ground saws, drills and other power tools that may be required at the working area. This can be done quickly and without extra extension cords. Grounded guards are available with either the standard closed end and reflector cage or with an open end cage, having a concentrating end lens and rotating reflector. With the latter, light can be beamed to otherwise inaccessible areas.

The phenolic handles are equipped with a Levolier switch, which is unconditionally guaranteed. The complete assembly is designed to resist oils, greases, some acids, flame, moisture and abrasion. The 3-wire handle also is available without the convenience outlet for grounding the lamp guard alone.

For additional data, circle item 862 *on the coupon on page* 107.

Subtransmission systems

(*Continued from page* 86)

of way, to each substation. The two different primary supply circuits increase the service continuity of the distribution substation. The multiple system is generally simpler to operate and relay than the "loop system"; and may be more or less expensive, depending upon the number, type, and ratings of the substations. A detailed description of the associated master unit substation arrangements and operation has been given in a companion article titled *Distribution Substation-System Planning.*

For single-transformer substations which are connected to a multiple type subtransmission system, there are two basic schemes for switching at the primary side of the transformer.

Scheme No. 1 of Fig. 5A illustrates the type of switching arrangement which is most commonly used. One disconnect switch is normally open while the other is closed. In the event of an outage of one of the subtransmission lines, the substation may be switched manually to the other line.

The motor-operated disconnect switches of scheme No. 2 perform the same functions as for scheme No. 1, Fig. 5A.

Scheme No. 3 provides the switching of scheme No. 1 except that it is all done automatically. In addition, with breakers for primary protection, differential protection of the substation transformer is possible without requiring remote tripping.

Fig. 5B shows the switching schemes which are available for two-transformer substations which are fed from a multiple subtransmission system.

Scheme No. 1 shows the simplest arrangement where each transformer is connected to its own source through a disconnect switch. In the event of an outage of one of the lines, the substation is fed through the remaining line and transformer.

The two additional disconnect switches of scheme No. 2 provide a means of manually connecting both transformers to the remaining substransmission line when the other line is de-energized.

The arrangement of scheme No. 3 gives the same switching as in No. 1; however, the presence of breakers allows differential protection of the transformers without de-energizing the line.

The tie disconnect switch of scheme No. 4 provides for connecting both transformers to one source (manually) when one of the subtransmission sources is de-energized.

Scheme No. 5 performs the same function as No. 4, but in addition ties both transformers to one line *automatically* if one source is de-energized, thus assuring continuous service to both transformers as long as at least one source is energized. This scheme allows the transformers to be automatically switched back to their normal source when service to both lines is resumed. Remote tripping is not required for transformer differential protection.

The switching functions of scheme No. 6 are quite elaborate and usually uneconomical, but provide for the most reliable and automatic service possible. In addition to providing throwover to either or both sources, the scheme also allows automatic isolation of a faulted transformer.

Grid subtransmission

When "subtransmission" was first brought into use in the late 1930's, many companies installed subtransmission substations without planning for a specific type of system as the load expanded. As a result, many of these systems "grew" into what might be classified as grid or network subtransmission systems. An example of such a system is illustrated in Fig. 6. As the load grew, the subtransmission lines were not extended as would be the case for a loop or a multiple system. Instead, the lines were tapped off the high voltage bus of adjacent distribution systems, forming, in effect, a combination loop and multiple subtransmission system.

The grid type subtransmission system offers many disadvantages, some of which are: (1) costly high voltage switching facilities at many of the distribution substations, (2) higher primary short circuit capacity, (3) more complex relaying schemes, (4) KW and VAR flow problems, (5) more complicated operating procedures. The above disadvantages clearly indicate that subtransmission systems should be planned toward one of the three preferred systems rather than a grid or network.

Heat pump story

(*Continued from page* 40)

heat is its efficiency. The heat pump does not actually convert electrical energy directly into heat as is the case with resistance type electric heating units. As its name implies, the heat pump actually operates as a heat transfer device, utilizing its refrigeration cycle to extract heat from the relatively cold air outside and to release it into the relatively warmer interior of the house.

Whereas a kilowatthour consumed in the conventional resistance type heater will produce approximately 3,413 Btu's of heat, a kilowatthour consumed in operating a heat pump will release some 9,000 to 15,000 Btu's of heat, depending upon the efficiency of the heat pump and certain other factors that affect its operation.

The heat pump operating with the condensing coil cooled by air will generally operate at a heating efficiency of about 3½ to 1, that is, for every Btu equivalent of electrical energy expended in the heat pump motor, approximately 3½

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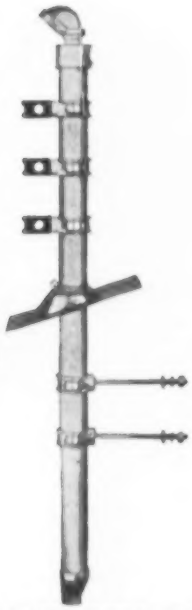

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Btu's will be released in the space heated.

There are some heat pumps on the market, however, which have the condensing coils cooled by water and others in which the cooling water is circulated through coils buried in the ground. Such arrangements, providing better cooling of the refrigerant in the condensing coil, will result in some increase in efficiency, that is, more heat liberated in the heated space for a given amount of electrical current expended in the heat pump compressor.

Contractor sells heat

(*Continued from page* 25)

ard installation techniques with heating wire installed in ceiling construction, Dixie Electric Company sold one job which amounted to $2,400 and another amounting to $2,000, with a single call in each case.

In its downtown Montgomery showroom, Dixie Electric Company maintains an impressive display of all types of electrical heating equipment from small radiant wall units, through blower-equipped circulating types, up to panel displays of typical radiant heating installations. All of these are kept in operating condition and are handy in pointing out the high BTU output of each, the protection which youngsters receive against accidental burns and other injuries, architectural harmonization made possible with a variety of colors and designs, etc.

Advance testing

In panel unit installation, Mr. Crump has followed a policy of careful engineering tests in the home well in advance of installation time, to determine the number of panels required in each room. Standard policy in the mild climate of Montgomery has been based on one panel unit in each room of the home, plus two or more in the living room, depending upon the size. Thermostatically controlled electrical heating units which function automatically throughout the cold months of the year have led the list; the average prospect building a home in the $20,000 or more classification prefers to "go a little farther" and get completely automatic heating.

Electric heating has been by no means confined to domestic residences, Mr. Crump reports. In many examples, electrical heat has solved specific problems in "part-time heating" required in business buildings, clinics, and even in churches. In fact, churches have proven ideal prospects for this form of heating, inasmuch as only small areas of the building require heat through the few week days and the operation of the central heating system for the entire building is prohibitively expensive.

In one such installation, Dixie Electric Company provided a three-unit electrical heating system in the pastor's study of one Montgomery church, providing adequate heat to keep the pastor and his staff warm at low expense. In another instance, a combination of panel heaters and duct work provided pleasant electric heat in meeting rooms, and class rooms used through the entire week in a Montgomery church.

Recognizing the fact that electrical home heating is a field in which the surface has scarcely been scratched, Mr. Crump lays great emphasis on maximum advertising of each job as it is installed and careful engineering which insures that there will never be any such thing as a dissatisfied customer, who would represent a definite "set back" in good will.

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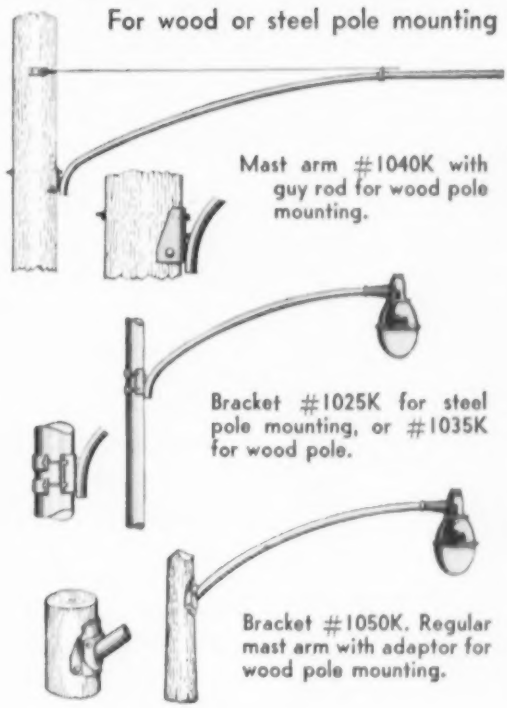

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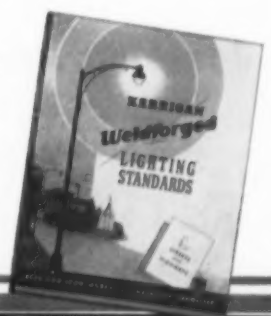

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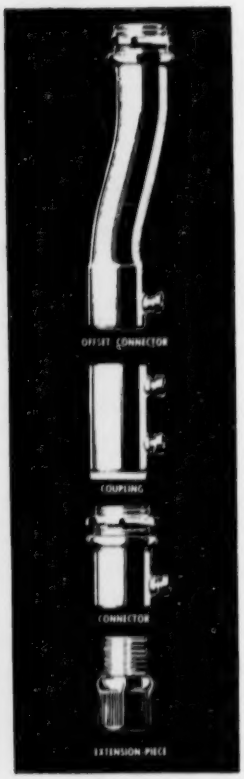

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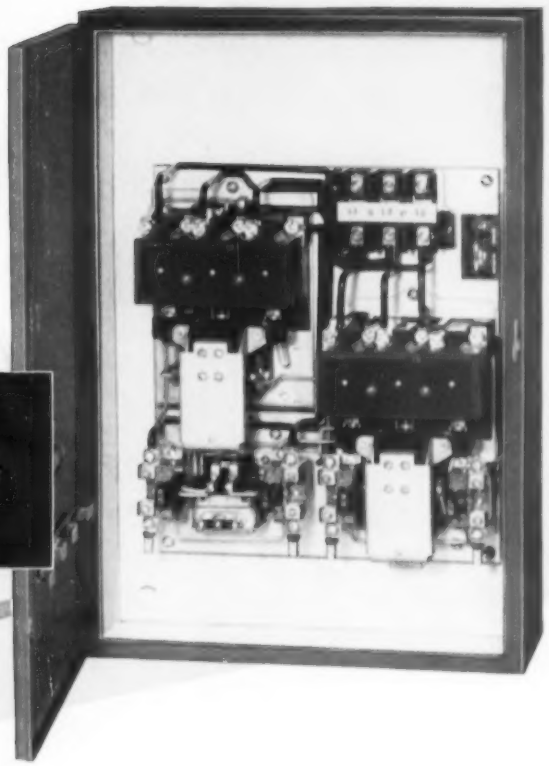

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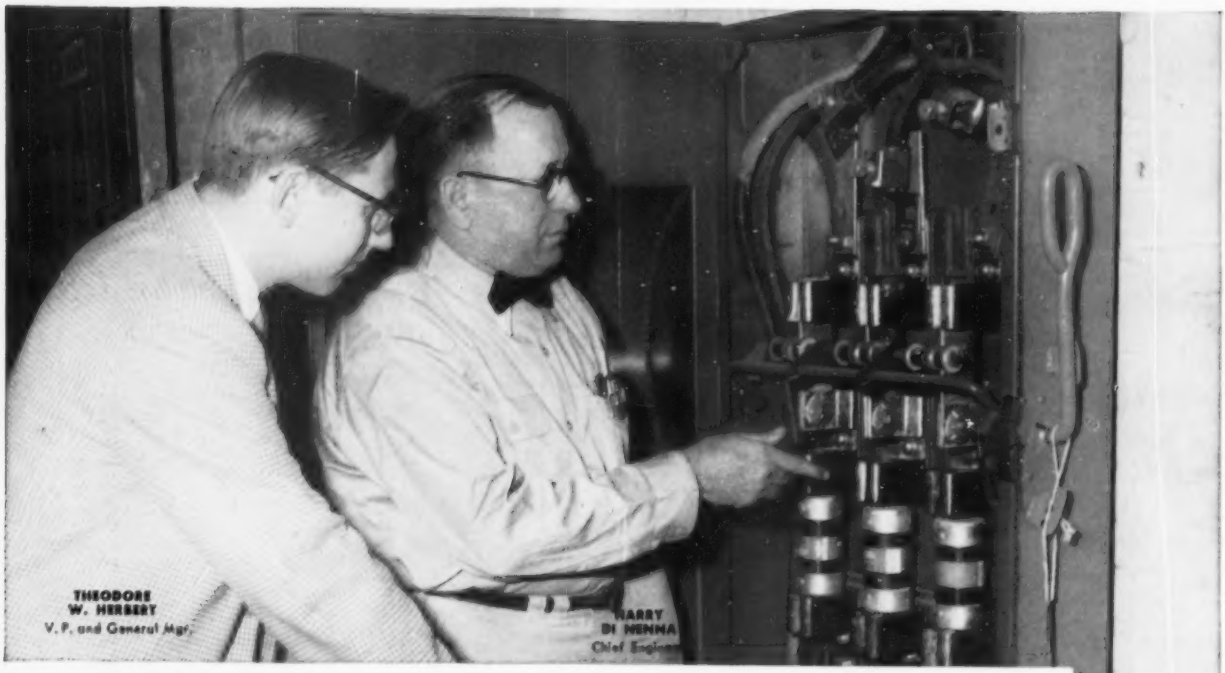

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